

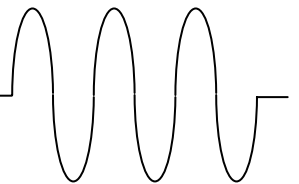
MTE Corporation

MATRIX FILTERTM

SERIES B

600 Volts, 60HZ

USER MANUAL



PART NO. INSTR - 013
REL. 060628

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IMPORTANT USER INFORMATION

NOTICE

The MTE Corporation Matrix Filter is designed for harmonic mitigation of six pulse inverter drives supplying variable torque loads in a wide variety of applications. The suitability of this filter for a specific application must therefore be determined by the customer. In no event will MTE Corporation assume responsibility or liability for any direct or consequential damages resulting from the use or application of this filter. Nor will MTE Corporation assume patent liability with respect to the use of information, circuits or equipment described in this instruction manual.

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1. IMPORTANT SAFETY INFORMATION

WARNING

**ONLY A QUALIFIED ELECTRICIAN CAN CARRY OUT THE ELECTRICAL
INSTALLATION OF THIS FILTER**

WARNING

High voltage is used in the operation of this filter. Use Extreme caution to avoid contact with high voltage when operating, installing or repairing this filter. **INJURY OR DEATH MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED.**

After removing power, allow at least five minutes to elapse and verify that the capacitors have discharged to a safe level before contacting internal components. Connect a DC voltmeter across the capacitor terminals or terminals 1, 2 and 3 on terminal block 1TB. Start with the meter on the highest scale and progressively switch to a lower scale as the indicated voltage falls below the maximum value of the scale used.

WARNING

The opening of the branch circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electrical shock, current-carrying parts and other components of the filter should be examined and replaced if damaged.

WARNING

An upstream disconnect/protection device must be used as required by the National Electrical Code (NEC).

WARNING

Even if the upstream disconnect/protection device is open, the drive down stream of the filter may feed back high voltage to the filter. The drive safety instructions must be followed. **INJURY OR DEATH MAY RESULT IF THE DRIVE SAFETY PRECAUTIONS ARE NOT OBSERVED.**

WARNING

The filter must be grounded with a grounding conductor connected to all grounding terminals.

WARNING

Only spare parts obtained from MTE Corporation or an authorized MTE distributor can be used.

2. INTRODUCTION

This manual was specifically developed to assist in the installation, interconnection and operation of the MTE Corporation Matrix Filter.

This manual is intended for use by personnel experienced in the operation and maintenance of electronic drives. Because of the high voltages required by the filter and drive and the potential dangers presented by rotating machinery, it is essential that all personnel involved in the operation and maintenance of this filter know and practice the necessary safety precautions for this type of equipment. Personnel should read and understand the instructions contained in this manual before installing, operating or servicing the filter and the drive to which the filter is connected.

Upon Receipt of this Filter:

The MTE Matrix Filter has been subjected to demanding factory tests before shipment. Carefully inspect the shipping container for damage that may have occurred in transit. Then unpack the filter and carefully inspect for any signs of damage. Save the shipping container for future transport of the filter.

In the event of damage, please contact and file a claim with the freight carrier involved immediately.

If the equipment is not going to be put into service upon receipt, cover and store the filter in a clean, dry location. After storage, ensure that the equipment is dry and that no condensation has accumulated on the internal components of the filter before applying power.

Repair/Exchange Procedure

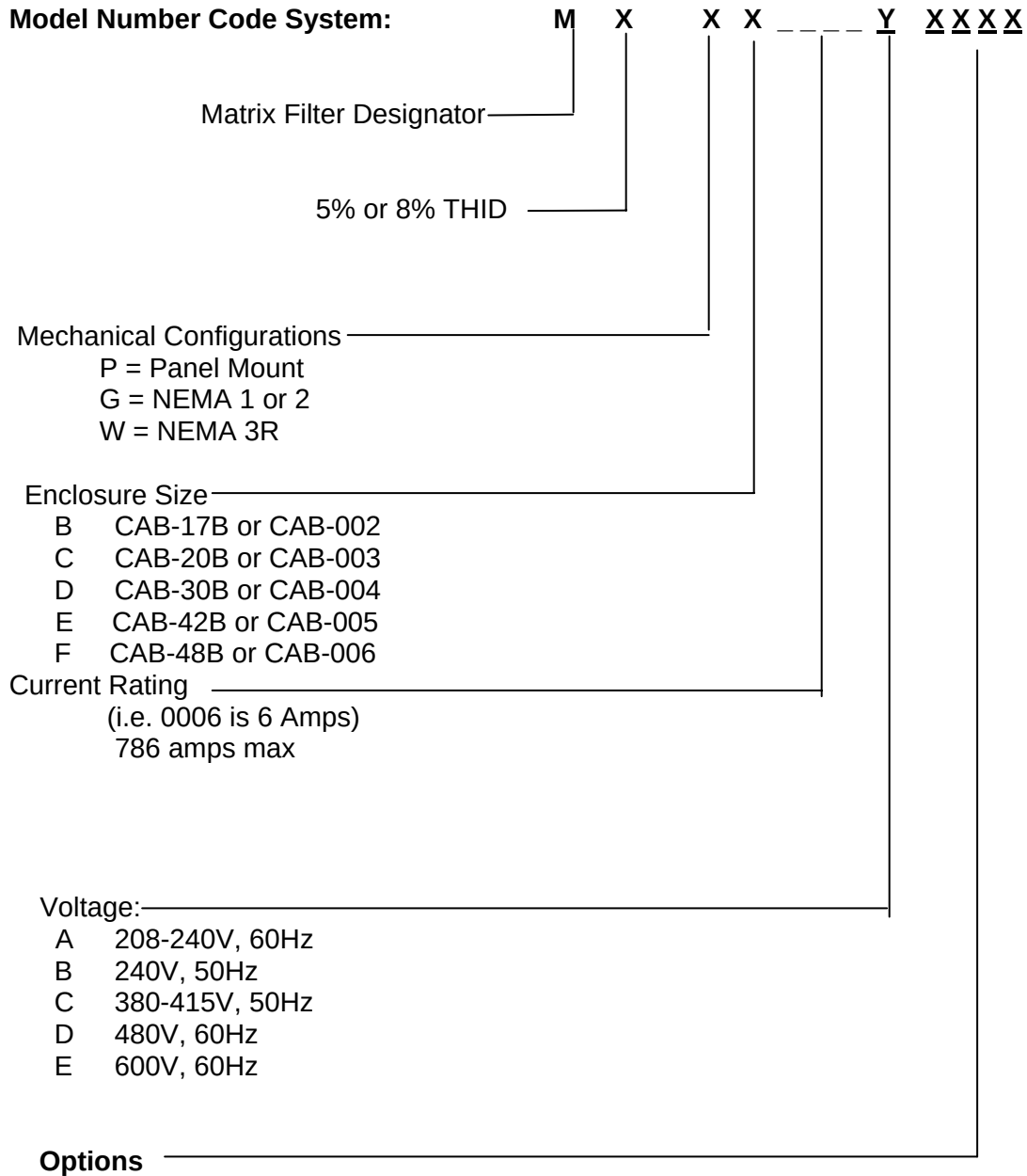
MTE Corporation requires a Returned Material Authorization Number before it can accept any filters that qualify for return or repair. If problems or questions arise during installation, setup, or operation of the filter, please call us for assistance at:

Phone: 262-253-8200 ex 148

FAX: 262-253-8222

3. MODEL NUMBER CODES

Model Code Part Number Configuration



SPECIFICATIONS - continued

4. SPECIFICATIONS

Ratings

Table 1

600 VAC, 60 Hz SERIES B Filter Ratings				
THID Rating	8%		5%	
Maximum Output Amps RMS	Efficiency (Typical) (%)	Power Dissipation @ Rated Current (Typical) (Watts)	Efficiency (Typical) (%)	Power Dissipation @ Rated Current (Typical) (Watts)
6	97.6	148	97.7	142
8	97.9	178	97.9	173
11	98.1	217	98.1	215
14	98.2	255	98.3	253
21	98.5	331	98.5	328
27	98.6	391	98.6	387
34	98.7	453	98.7	449
44	98.8	545	98.8	542
52	98.9	615	98.9	611
66	98.9	722	99.0	718
83	99.0	845	99.0	843
103	99.1	980	99.1	977
128	99.1	1139	99.1	1136
165	99.2	1352	99.2	1349
208	99.3	1619	99.3	1614
240	99.3	1828	99.3	1821
320	99.3	2188	99.3	2184
403	99.4	2541	99.4	2529
482	99.4	2932	99.4	2915
636	99.5	3639	99.5	3621
786	99.5	4288	99.5	4267

Service Conditions

Load: 6 pulse variable torque rectifier only

Input voltage: 600 VAC +/- 10%, 60 ± 0.75 Hz, 3 phase

Input voltage line unbalance: 1% maximum

Maximum source impedance: 6.00%

Minimum source impedance: 1.5%

Service Factor: 1.00

SPECIFICATIONS - continued

Ambient Temperature (Operating)

Enclosed Filters:	-40 to +40 degrees C
Open Panel Filters:	-40 to +50 degrees C
Storage Temperature:	-40 to +90 degrees C

Altitude: 0 to 3300 Feet above sea level. Refer to Figure 6 for altitude derating.

Relative Humidity: 0 to 95% non-condensing

Agency Approvals

UL and cUL listed to UL508 and CSA-C22.2 No 14-95
File E180243 (3 – 1000 HP, 120VAC through 600 VAC
50, 50/60, 60 Hz Three Phase

Performance

Total Harmonic Current Distortion:

Eight Percent Filter: 8% typical at full load	12% maximum no load to full load
Five Percent Filter: 5% typical at full load	8% maximum no load to full load

Standby Current:

Without Optional Capacitor Contactor: 70% of the full load capacitor current listed in Table 3

With Optional Capacitor Contactor: Refer to Drive Users Manual

		8%	5%
FILTER VOLTAGE REGULATION		600	600
MAXIMUM OUTPUT VOLTAGE AT NO LOAD	RMS PEAK	627 885	627 885
MINIMUM OUTPUT VOLTAGE AT FULL LOAD	RMS PEAK	575 750	575 750
*MAXIMUM PCC VOLTAGE WITH 6% SOURCE IMPEDANCE	RMS PEAK	612 864	612 864

Note: PCC is the point of common coupling with the power distribution system

SPECIFICATIONS - continued

**Weights
Table 2**

600 Volt, 60 Hz Series B Matrix Filter Weights						
Output Amps RMS	Open Panel		General Purpose NEMA 1, 2, 3R		Industrial NEMA 1	
	THID		THID		THID	
	8% Weight Lbs	5% Weight Lbs	8% Weight Lbs	5% Weight Lbs	8% Weight Lbs	5% Weight Lbs
6	30	42	90	103	68	80
8	33	44	93	105	71	82
11	39	50	105	115	77	88
14	39	50	105	115	88	100
21	50	66	115	132	93	110
27	55	71	148	165	110	127
34	77	93	175	193	138	155
44	77	93	175	193	138	155
52	120	155	280	315	270	305
66	145	178	345	380	310	345
83	230	290	410	465	375	430
103	230	290	410	465	375	430
128	260	315	440	500	400	460
165	305	375	480	550	545	615
208	315	375	490	545	555	615
240	345	425	575	650	600	715
320	750	900	850	1000	1350	---
403	805	1015	955	1165	1450	---
482	890	1115	1025	1245	1550	---
636	1555	1925	1380	1750	---	---
786	1860	2375	1685	2200	---	---

SPECIFICATIONS - continued

Table 3

600 VAC Matrix Filters Capacitor Current at Full Load							
Filter Current Rating Amps Rms	Capacitor Current (Typical) Amps RMS		Filter Current Rating Amps Rms	Capacitor Current (Typical) Amps RMS		Filter Current Rating Amps Rms	Capacitor Current (Typical) Amps RMS
6	2.2		44	16.1		208	75.9
8	2.9		52	19.0		240	87.6
11	4.0		66	24.1		320	116.8
14	5.1		83	30.3		403	147.1
21	7.7		103	37.6		482	175.9
22	9.9		128	46.7		636	232.1
34	12.4		165	60.2		786	286.9

Figure 1

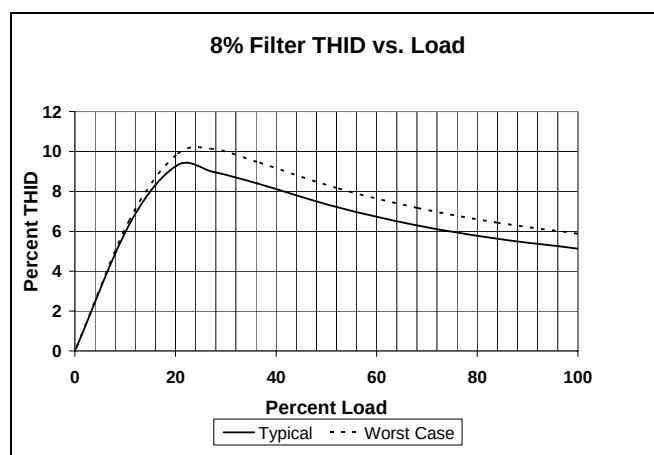


Figure 2

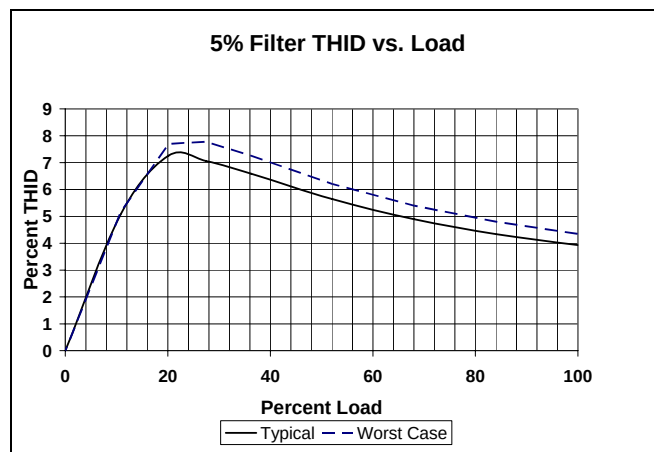


Figure 3

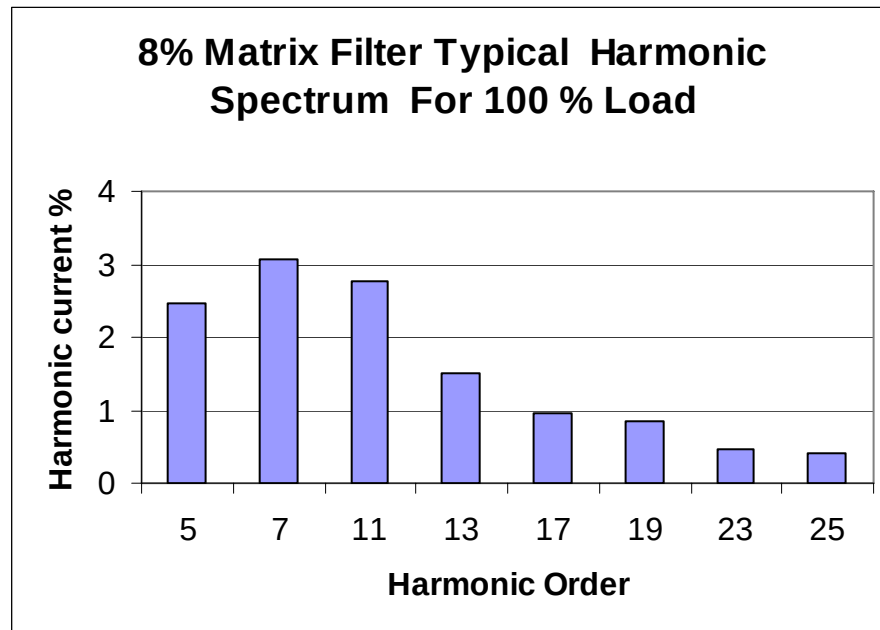


Figure 4

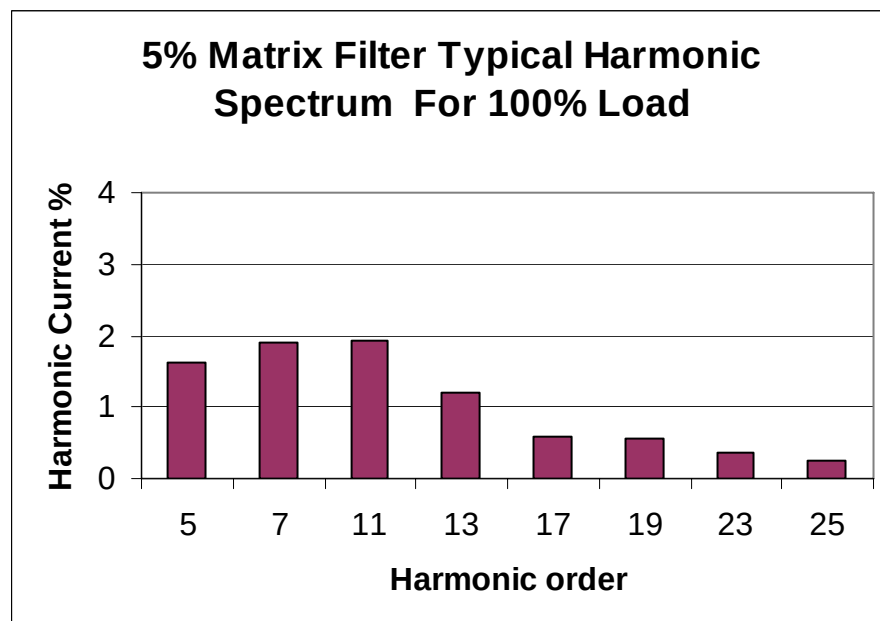
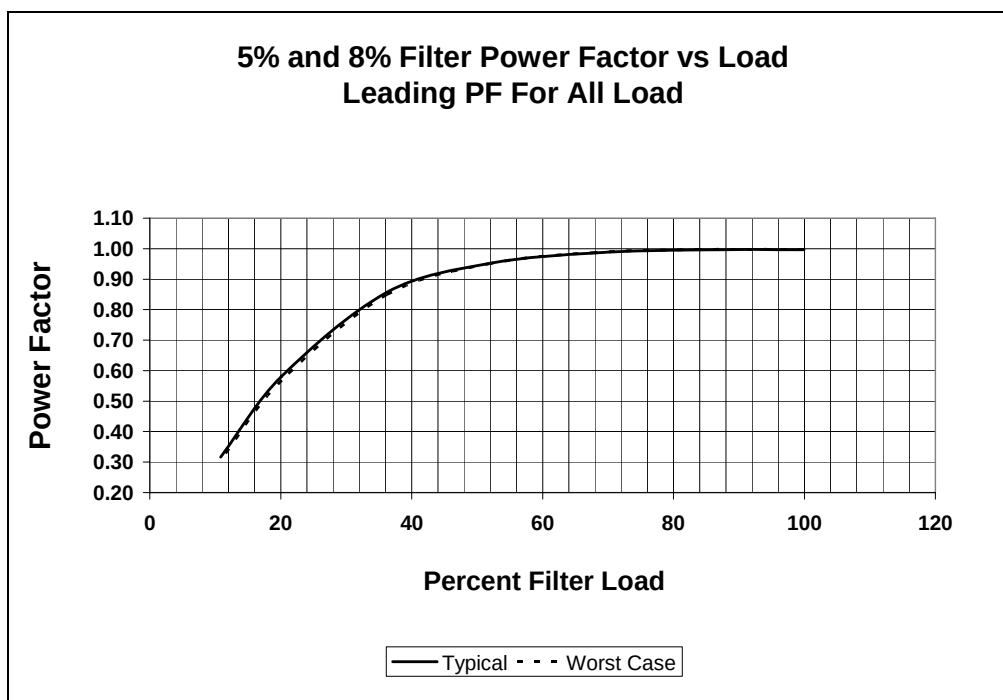
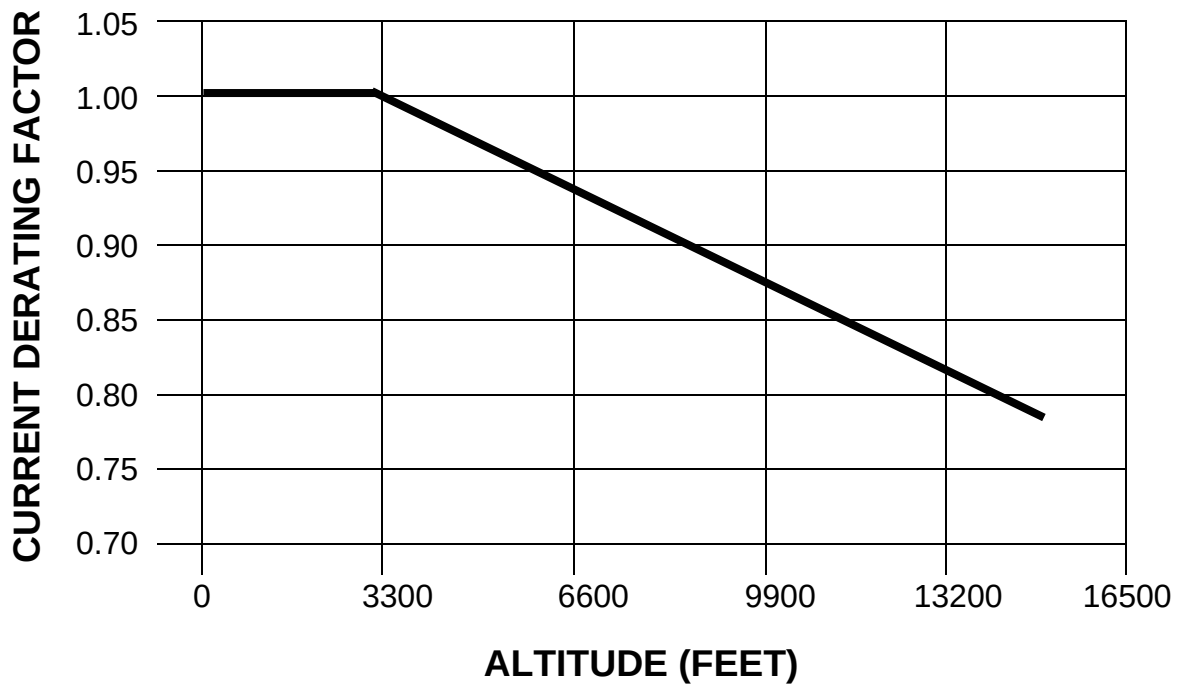


Figure 5**Performance With Unbalanced Line Voltage (Typical)****Table 4**

All Components at Nominal Values and Worst Case Service Conditions		
	8% Filter 100% Load	5% Filter 100% Load
Nominal THID	5.12%	3.93%
1% Unbalance	5.28%	4.06%
2% Unbalance	5.82%	4.47%
3% Unbalance	6.62%	5.10%
	8% Filter 30% Load	5% Filter 30% Load
Nominal THID	10.13%	7.06%
1% Unbalance	10.61%	7.45%
2% Unbalance	12.11%	8.21%
3% Unbalance	14.30%	10.46%

Figure 6

Altitude Derating Curve



5. INSTALLATION INSTRUCTIONS

Filter Installation

Matrix Filters are supplied in the following mechanical configurations:

- Panel mounted assemblies

- Floor mounted general purpose NEMA 1, 2, & 3R cabinets

- Industrial style NEMA 1 cabinets with hinged doors.

Panel mounted filters are designed for mounting in the vertical plane in the customer's enclosure. Include the power dissipation of the filter along with all the other components located in the panel to determine the internal temperature rise and cooling requirements of the enclosure. Allow a minimum side clearance of four (4) inches and a vertical clearance of six (6) inches for proper heat dissipation and access. Figure 7 through Figure 17 contain outline drawings for the various ratings and show proper mounting orientation. For 5% filters, Model numbers beginning with M5, refer to Figure 18 and Table 5 for the dimensions of the separately mounted input reactor.

Select a well ventilated, dust-free area away from direct sunlight, rain or moisture. Do not install in or near a corrosive environment. Avoid locations where the filter would be subjected to excessive vibrations.

General purpose NEMA 1, 2, and 3R enclosed filters are designed for floor mounting in the vertical plane in an environment suitable for the enclosure type. Do not install in or near a corrosive environment. Avoid locations where the filter would be subjected to excessive vibrations. Allow a minimum side and back clearance of eight (8) inches and front clearance of thirty-six (36) inches for proper heat dissipation and access. Table 6 will direct you to the appropriate outline drawings shown in Figure 19 through Figure 23.

Industrial style NEMA 1 enclosed filters are designed for wall and floor mounting in the vertical plane. Do not install in or near a corrosive environment. Avoid locations where the filter would be subjected to excessive vibrations. For wall mounted enclosures allow a minimum side clearance of eight (8) inches and front clearance of forty-eight (48) inches for proper heat dissipation and access. For floor mounted enclosures allow a minimum side and back clearance of eight (8) inches and front clearance of forty-eight (48) inches for proper heat dissipation and access. Table 7 will direct you to the appropriate outline drawings shown in Figure 24 through

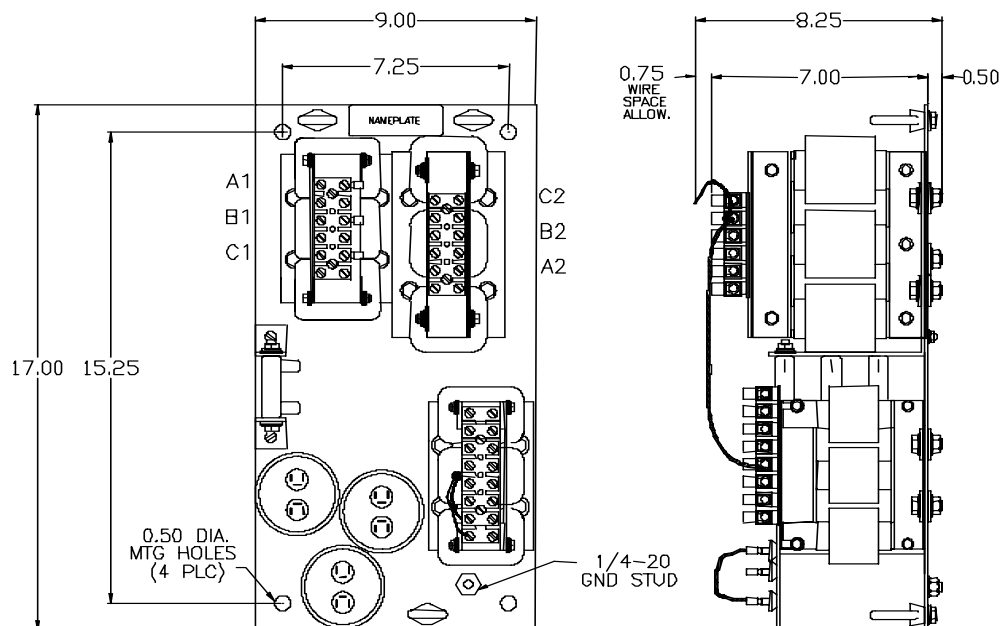
Figure 28.

INSTALLATION INSTRUCTIONS - continued

Mounting Dimensions And Outline Drawings

Panel Mounted Filters Figure 7 6 – 21 Amps, 600 VAC 60Hz Outline Drawing

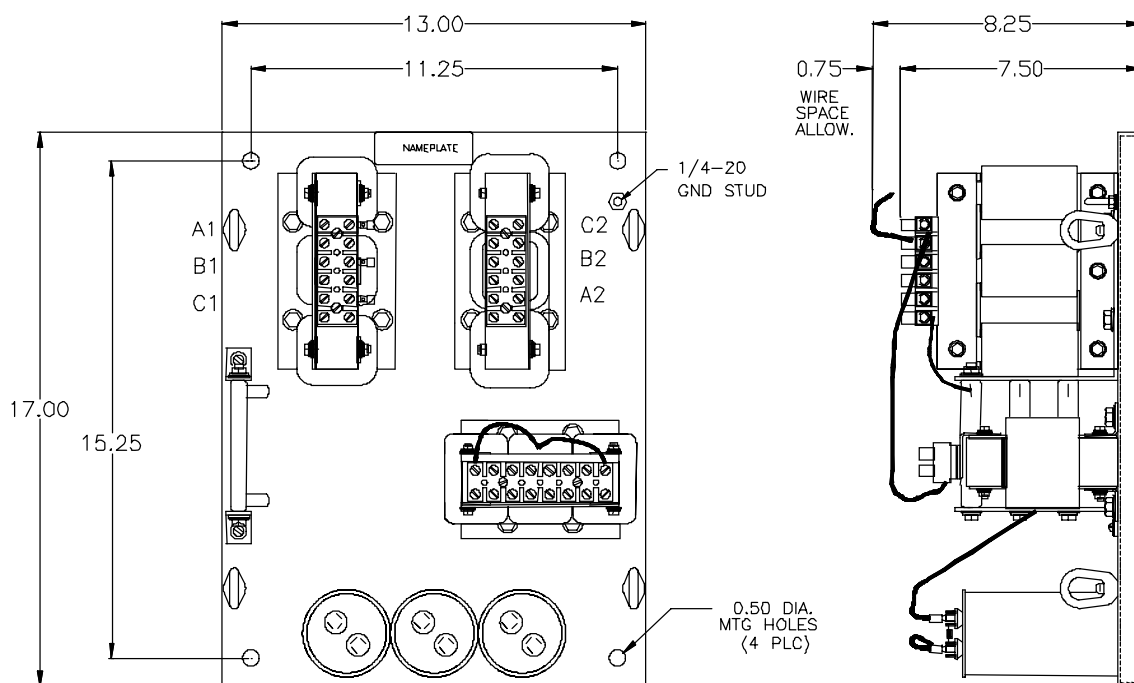
All dimensions are in inches



INSTALLATION INSTRUCTIONS - continued

Figure 8
27 Amps, 600 VAC 60Hz Outline Drawing

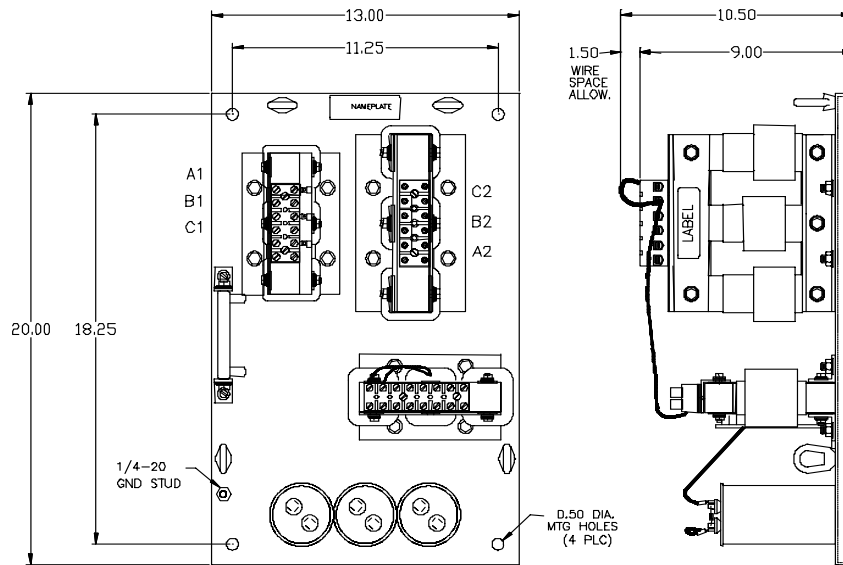
All dimensions are in inches



INSTALLATION INSTRUCTIONS - continued

Figure 9
34 – 44 Amps, 600 VAC 60Hz Outline Drawing

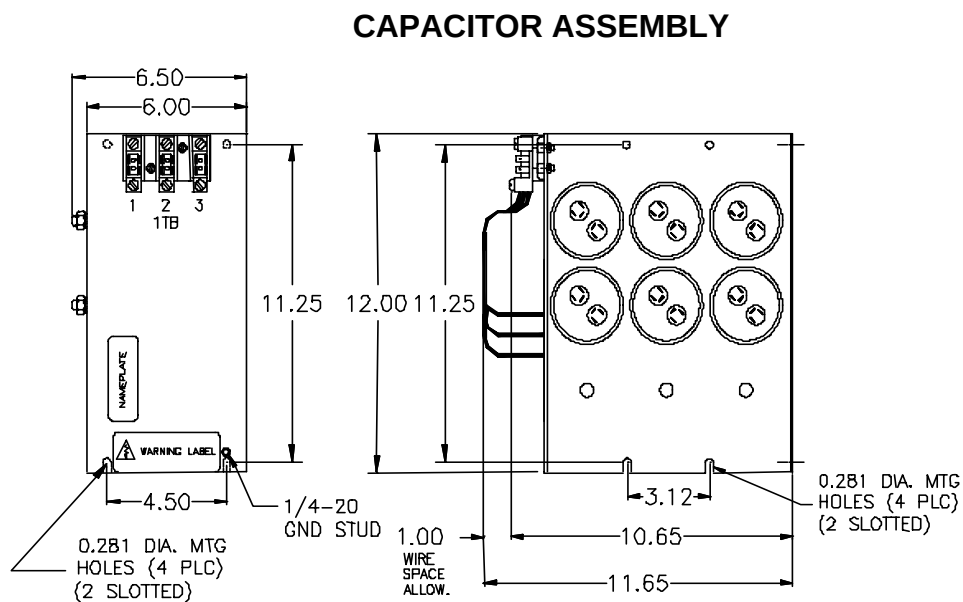
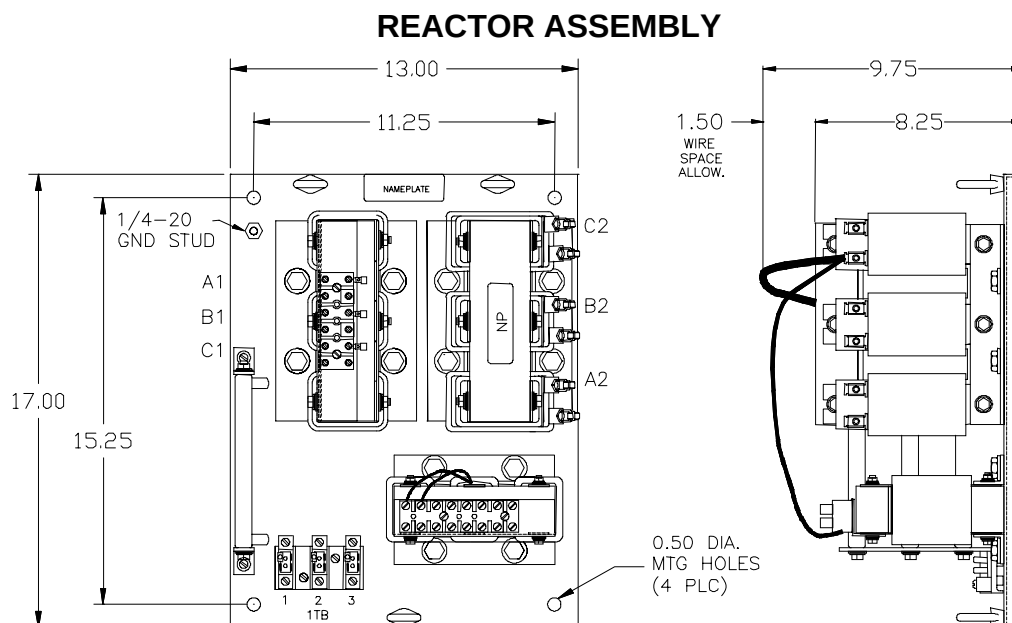
All dimensions are in inches



INSTALLATION INSTRUCTIONS - continued

Figure 10
52 - 66 Amps, 600 VAC 60Hz Outline Drawing

All dimensions are in inches



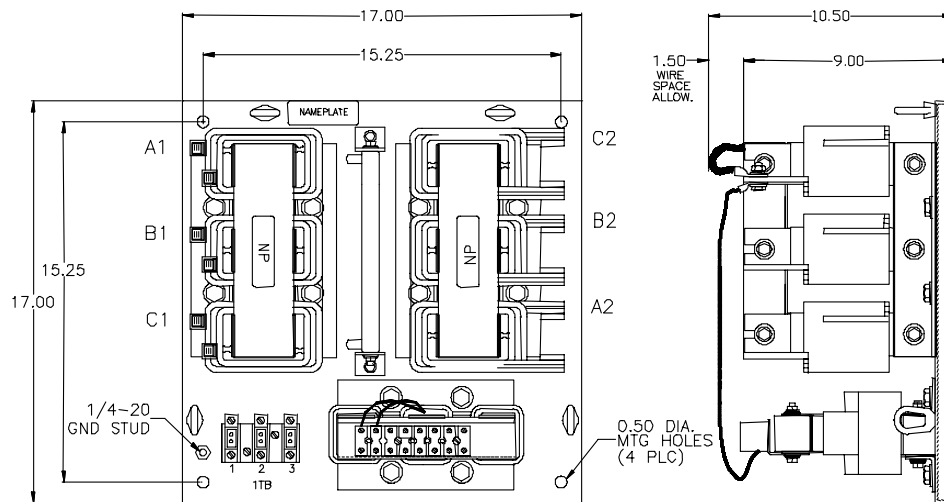
NOTE: CAPACITOR ASSEMBLY MAY BE MOUNTED IN EITHER PLANE

INSTALLATION INSTRUCTIONS - continued

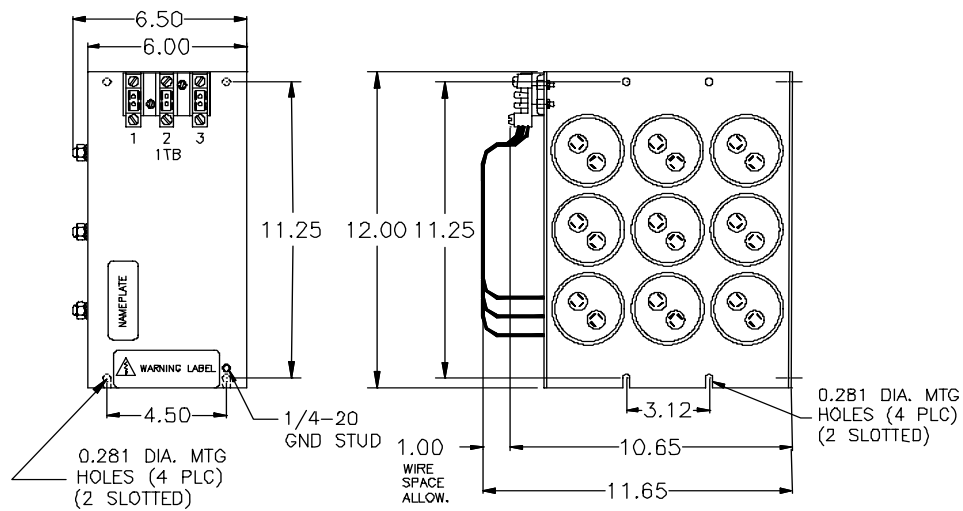
Figure 11
83 – 128 Amps, 600 VAC 60Hz Outline Drawing

All dimensions are in inches

REACTOR ASSEMBLY



CAPACITOR ASSEMBLY



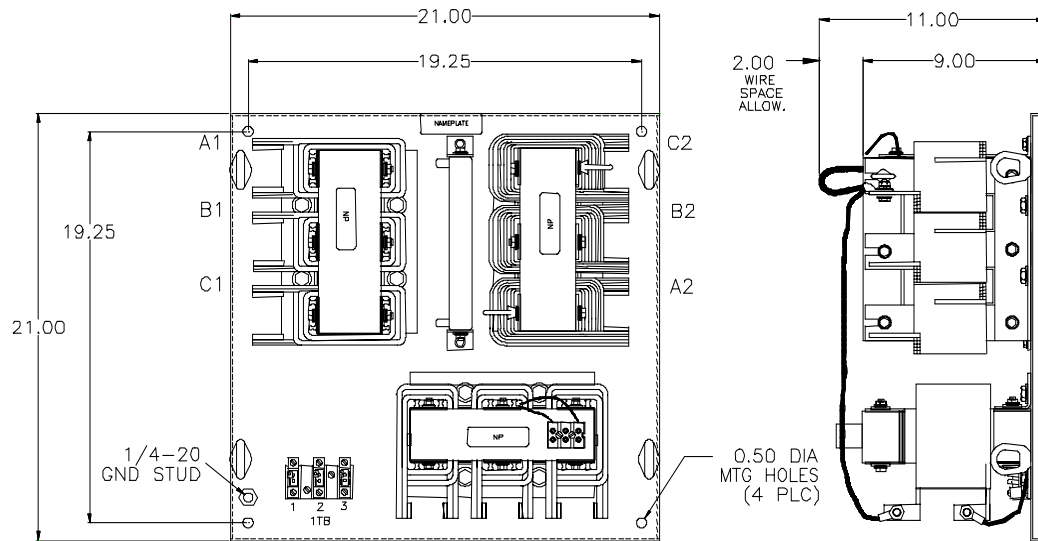
NOTE: CAPACITOR ASSEMBLY MAY BE MOUNTED IN EITHER PLANE

INSTALLATION INSTRUCTIONS - continued

Figure 12
165 Amps, 600 VAC 60Hz Outline Drawing

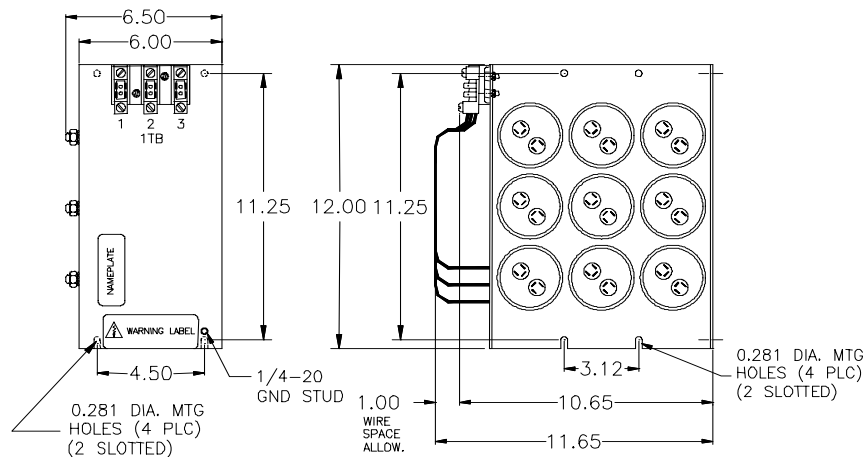
All dimensions are in inches

REACTOR ASSEMBLY



NOTE: SEE TABLE FOR NUMBER OF CAPACITOR ASSEMBLIES

CAPACITOR ASSEMBLY

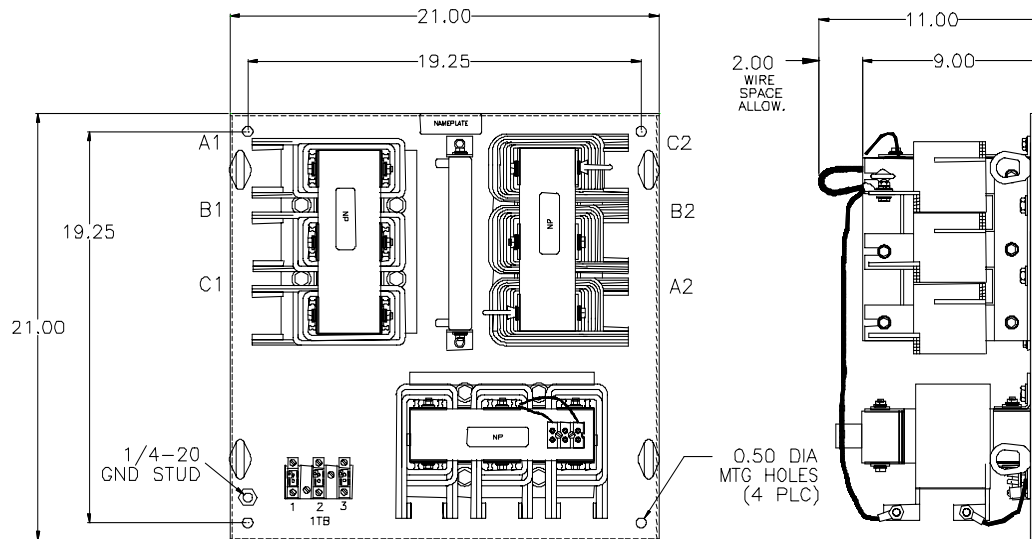


INSTALLATION INSTRUCTIONS - continued

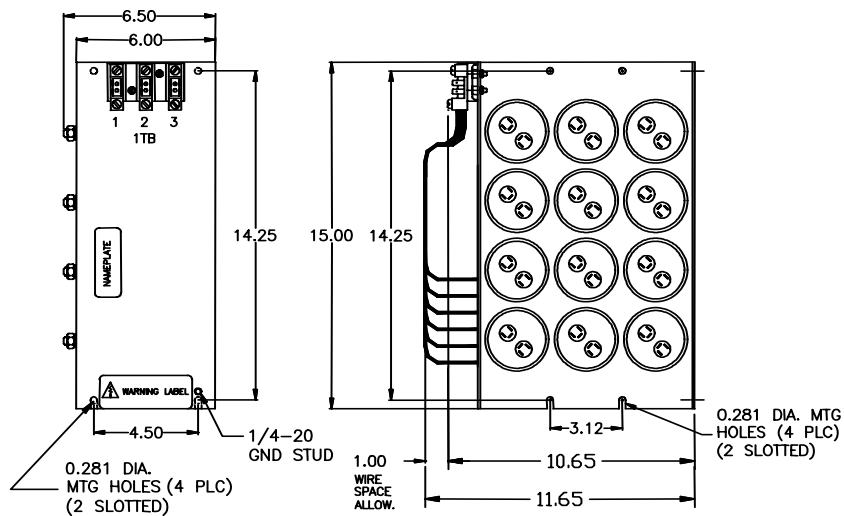
Figure 13
208 - 240 Amps, 600 VAC 60Hz Outline Drawing

All dimensions are in inches

REACTOR ASSEMBLY



CAPACITOR ASSEMBLY

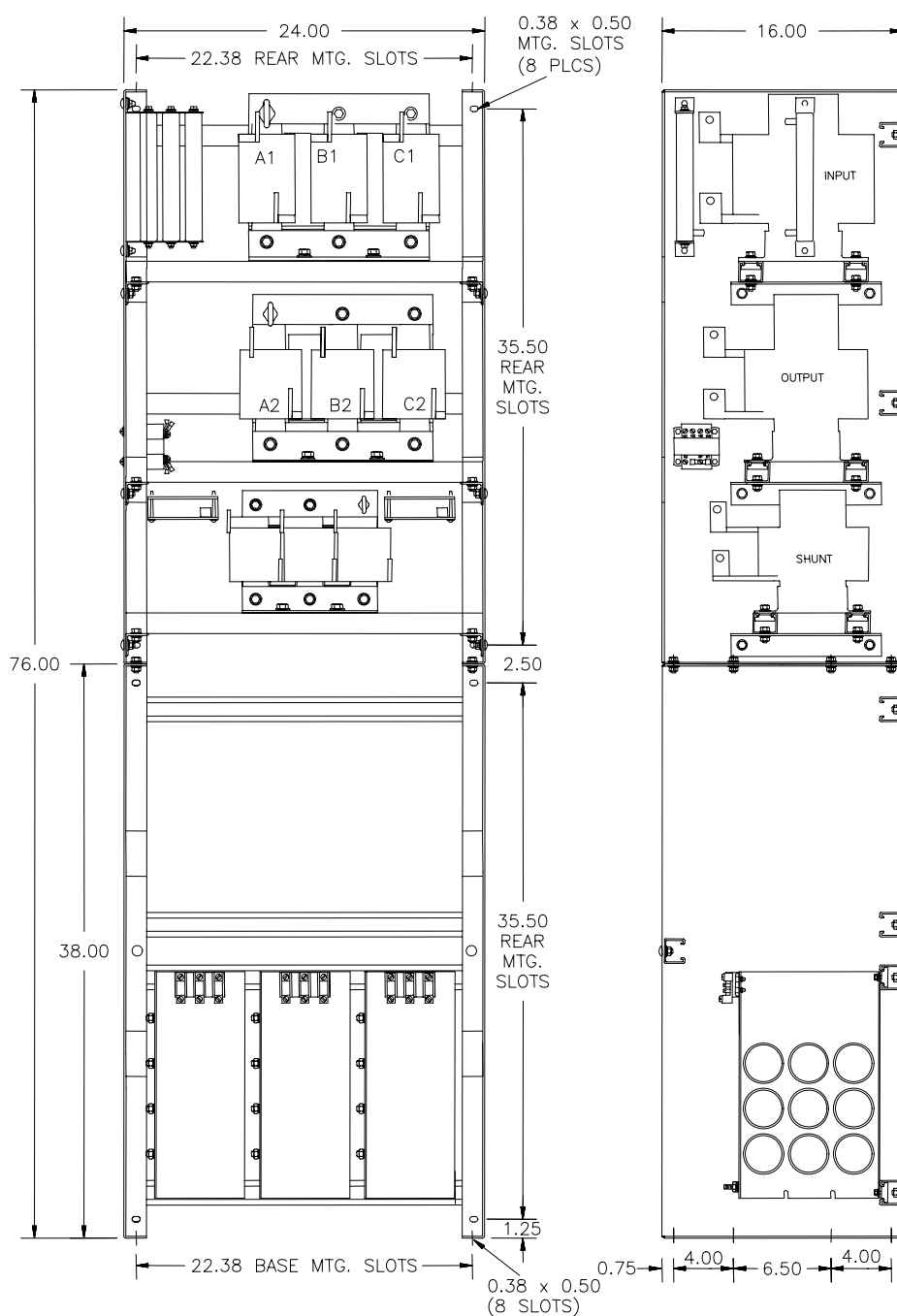


INSTALLATION INSTRUCTIONS - continued

Figure 14

320 – 482 Amps, 600 VAC 60Hz Vertical Mounting Outline Drawing

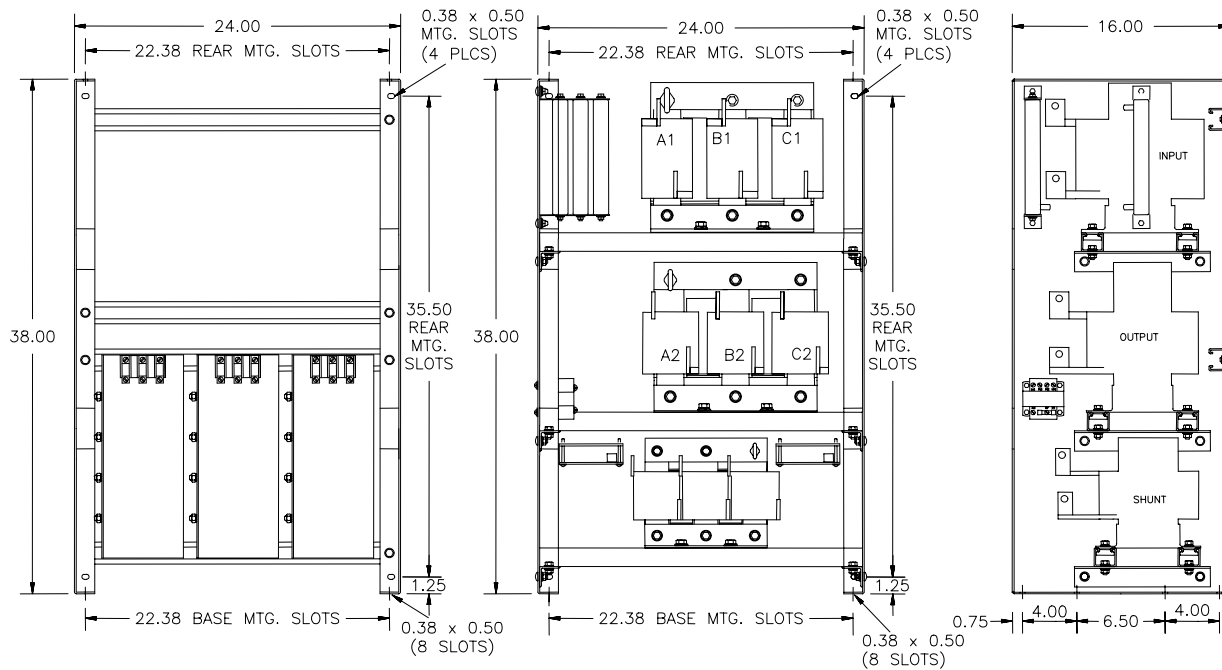
All dimensions are in inches



INSTALLATION INSTRUCTIONS - continued

Figure 15
320 – 482 Amps, 600 VAC 60Hz Horizontal Mounting Outline Drawing

All dimensions are in inches



600 VAC Matrix Filters rated 320 amps through 786 amps are constructed from a reactor assembly and a capacitor assembly. These assemblies are designed to be mounted vertically. The reactor assembly may be mounted above the capacitor assembly as shown in Figure 14 or the assemblies may be mounted separately as shown in Figure 15. The capacitor assembly should be located in the lowest temperature regions of the enclosure – generally toward the bottom. For 600 VAC Matrix Filters rated 636 amps through 786 amps see Figures 16 and 17.

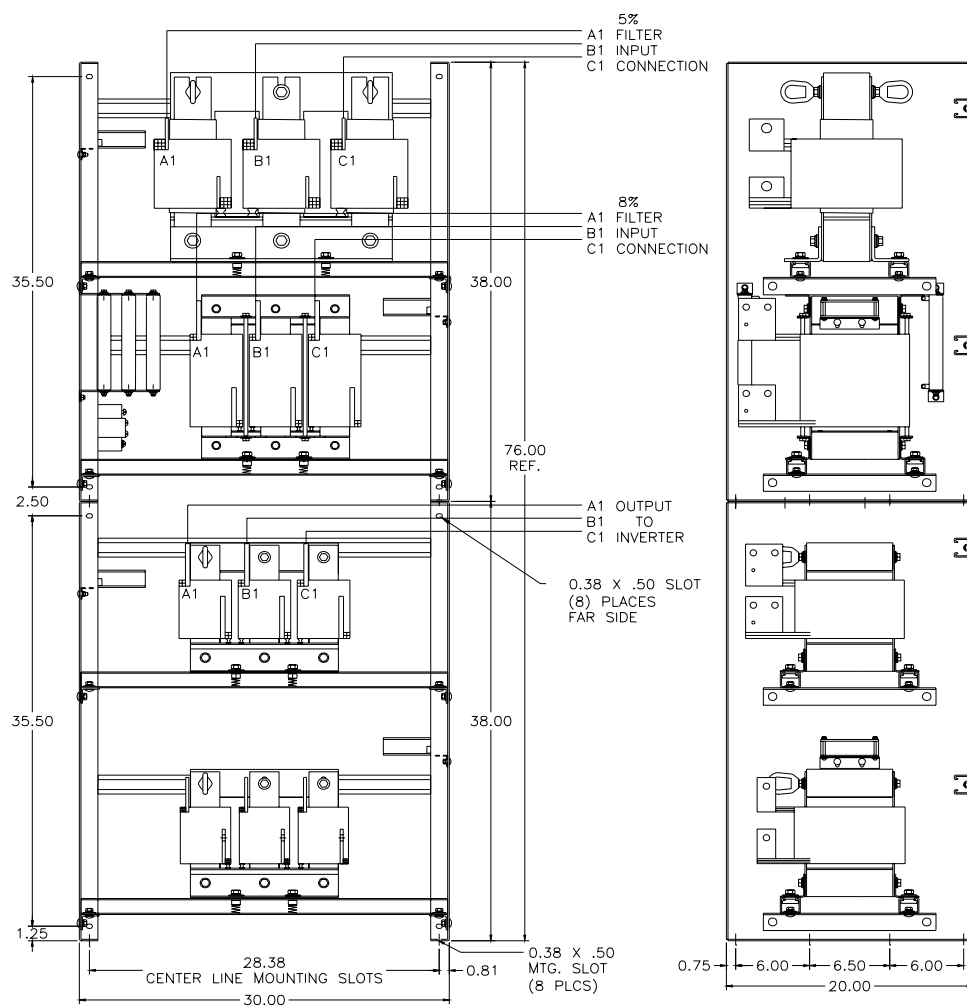
The reactor and capacitor assemblies are shipped vertically oriented bolted and banded front-to-back to a common pallet.

INSTALLATION INSTRUCTIONS - continued

Figure 16

636 – 786 Amps, 600 VAC 60Hz Vertical Mounting Outline Drawing

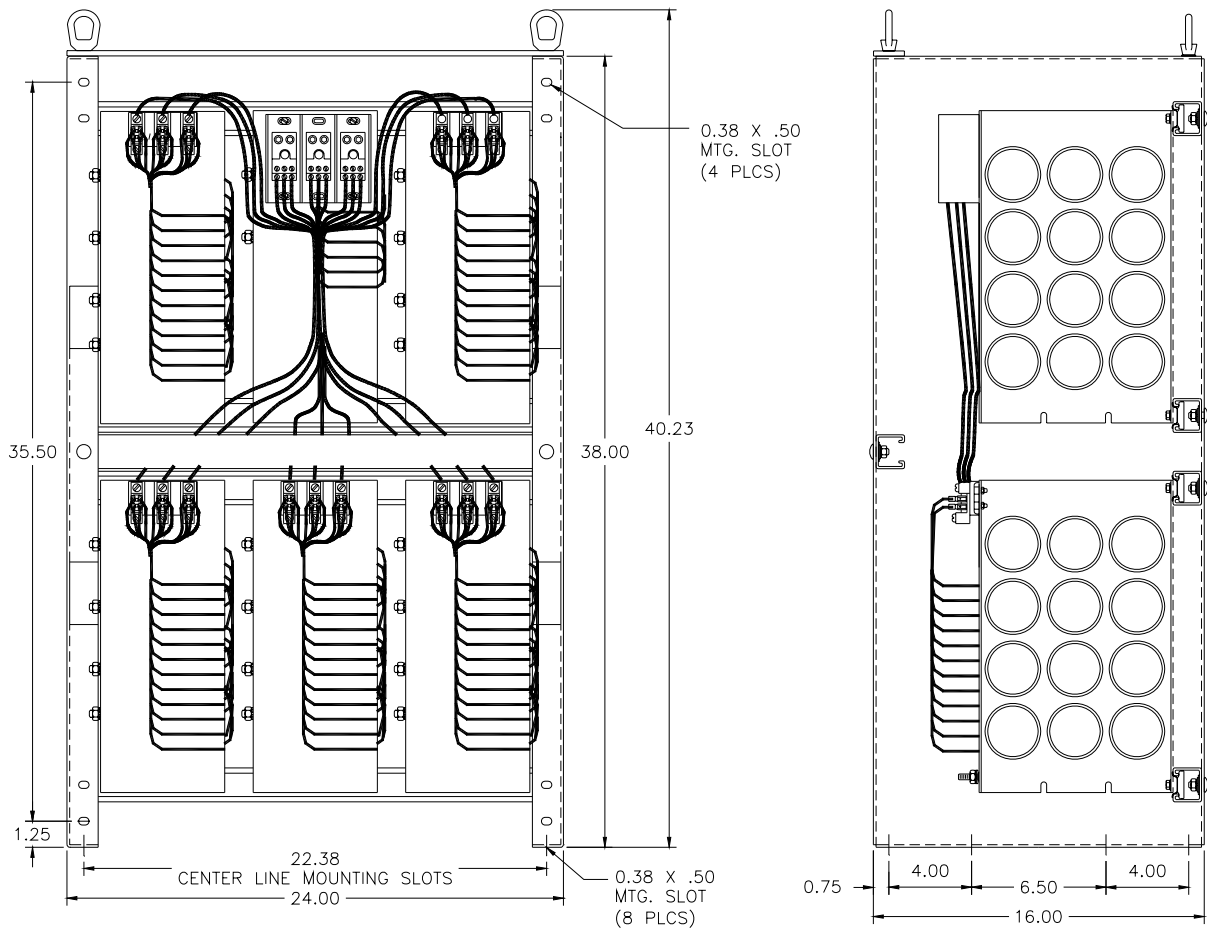
All dimensions are in inches



INSTALLATION INSTRUCTIONS - continued

Figure 17
636 – 786 Amps, 600 VAC 60Hz Capacitor Assembly Outline Drawing

All dimensions are in inches



INSTALLATION INSTRUCTIONS - continued

Figure 18

5% PANEL MOUNTED FILTER INPUT REACTOR MOUNTING DIMENSIONS

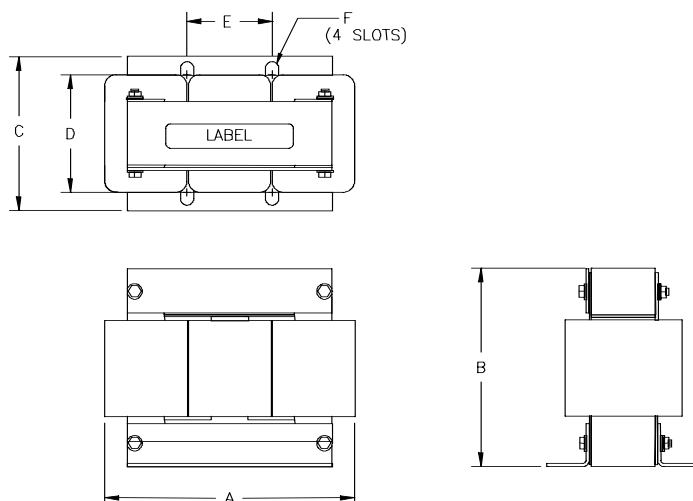


TABLE 5

FILTER RATING AMPS	A Inches	B Inches	C Inches	D Inches	E Inches	F Inches	WEIGHT LBS
6	6.0	5.0	3.4	2.62	2.0	0.281	11
8	6.0	4.8	3.0	2.10	2.0	0.281	8
11	6.0	4.8	3.0	2.10	2.0	0.281	8
14	6.0	5.0	3.3	2.10	2.0	0.281	10
21	6.0	5.3	3.5	2.48	2.0	0.281	12
27	7.3	6.0	3.5	2.35	3.0	0.390	14
34	7.3	5.8	4.0	2.75	3.0	0.390	16
44	7.3	5.8	4.0	2.75	3.0	0.390	16
52	9.0	7.4	4.8	3.16	3.0	0.38 x 0.75	28
66	9.0	7.0	5.3	3.16	3.0	0.38 x 0.75	27
83	10.8	8.5	6.5	3.47	3.63	0.38 x 0.75	51
103	10.8	8.5	6.3	3.47	3.63	0.38 x 0.75	51
128	11.0	8.5	7.0	3.46	3.63	0.38 x 0.75	47
165	10.8	8.5	6.8	3.66	3.63	0.38 x 0.75	62
208	11.0	8.5	7.0	3.47	3.63	0.38 x 0.75	51
240	11.5	8.5	8.3	4.41	3.63	0.38 x 0.75	67
320	14.5	11.3	11.3	5.88	4.60	0.56 x 1.0	143
403	15.0	11.3	12.0	7.13	4.60	0.56 x 1.0	190
482	15.5	11.3	14.5	7.26	4.60	0.56 x 1.0	200
636	15.5	11.3	13.0	8.0	4.60	0.56 x 1.0	250
786	22.0	16.8	15.5	9.51	7.20	0.56	430

INSTALLATION INSTRUCTIONS - continued

NEMA 1, 2 & 3R cabinets

Table 6

General Purpose Cabinets NEMA 1, 2, & 3R	
Filter Output Rating Amps.	Cabinet Part Number
6	CAB-17B
8	CAB-17B
11	CAB-17B
14	CAB-17B
21	CAB-20B
27	CAB-20B
34	CAB-20B
44	CAB-20B
52	CAB-30B
66	CAB-30B
83	CAB-30B
103	CAB-30B
128	CAB-30B
165	CAB-30B
208	CAB-30B
240	CAB-30B
320	CAB-42B
403	CAB-42B
482	CAB-42B
636	CAB-42B
786	CAB-48B

INSTALLATION INSTRUCTIONS - continued

Figure 19
CAB-17B

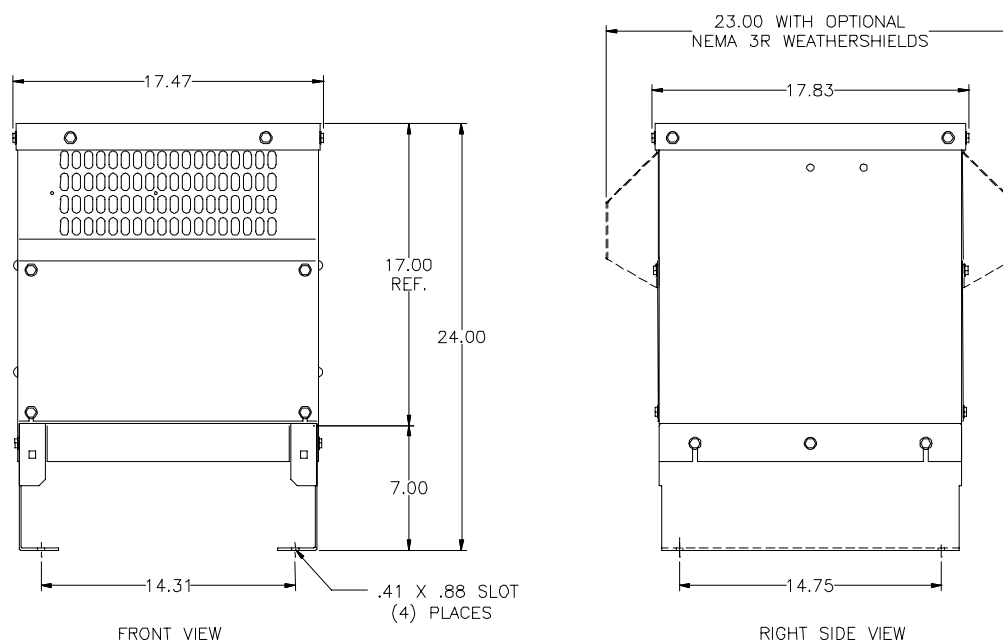


Figure 20
CAB-20B

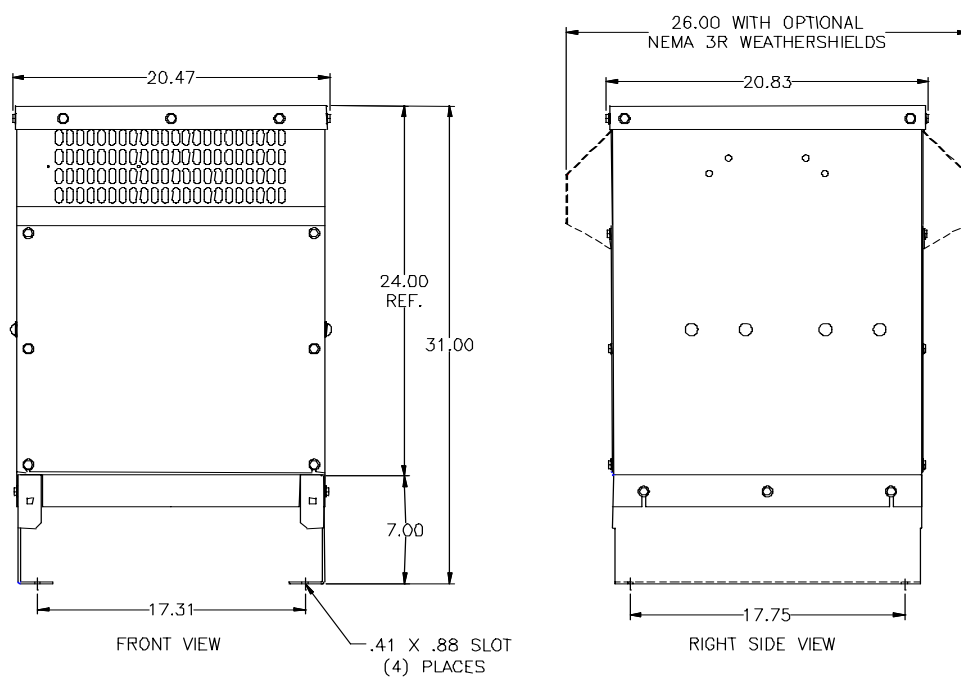


Figure 21
CAB-30B

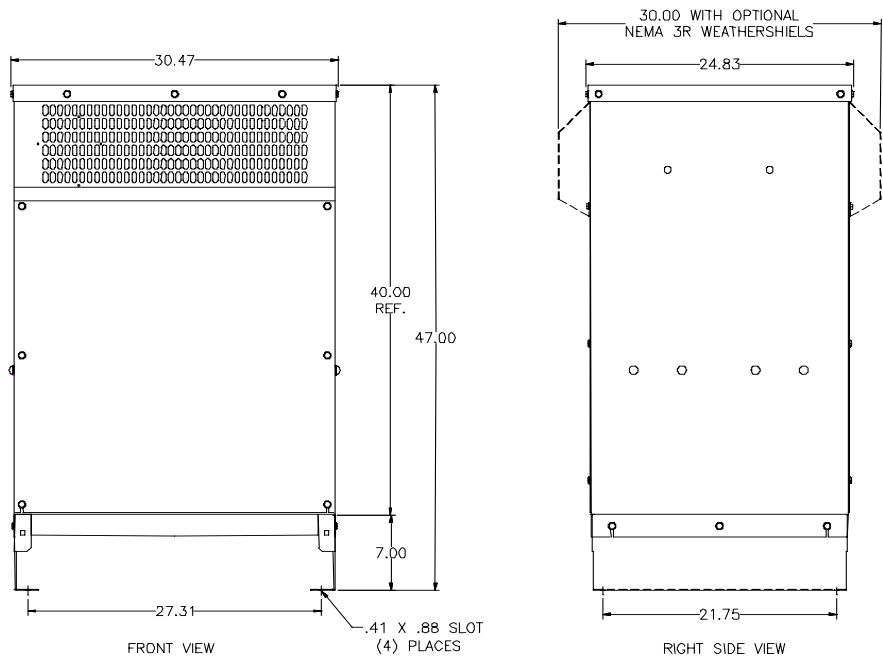


Figure 22
CAB-42B

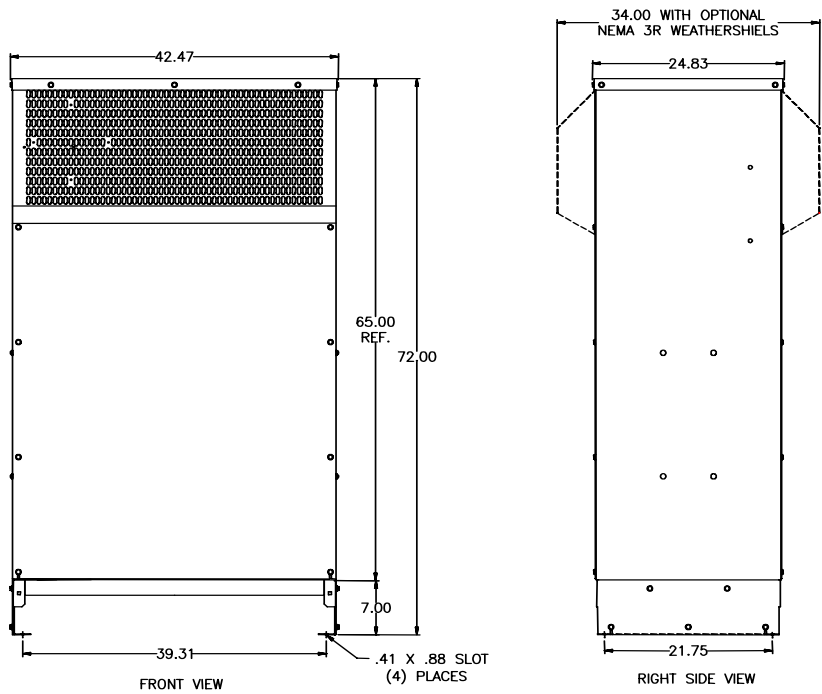
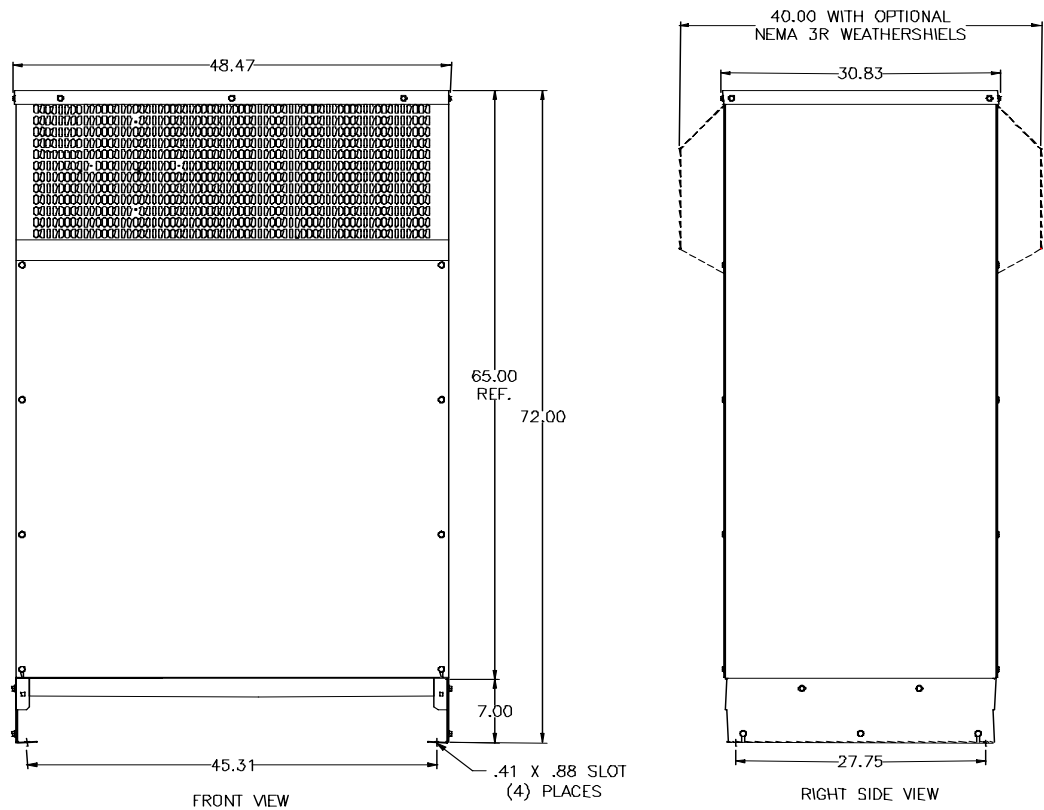


Figure 23
CAB-48B



INSTALLATION INSTRUCTIONS - continued

Mounting dimensions and outline drawings for wall and floor mounted NEMA 1 cabinets follow.

Table 7

NEMA 1 Industrial Style Enclosures	
Filter Output Rating Amps.	Cabinet Part Number
6	Cabinet-002
8	Cabinet-002
11	Cabinet-002
14	Cabinet-002
21	Cabinet-002
27	Cabinet-003
34	Cabinet-003
44	Cabinet-003
52	Cabinet-004
66	Cabinet-004
83	Cabinet-004
103	Cabinet-004
128	Cabinet-004
165	Cabinet-005
208	Cabinet-005
240	Cabinet-005
320	Cabinet-006*
403	Cabinet-006*
482	Cabinet-006*
636	N/A
786	N/A

*Floor Mounted

INSTALLATION INSTRUCTIONS - continued

Figure 24

Cabinet-002

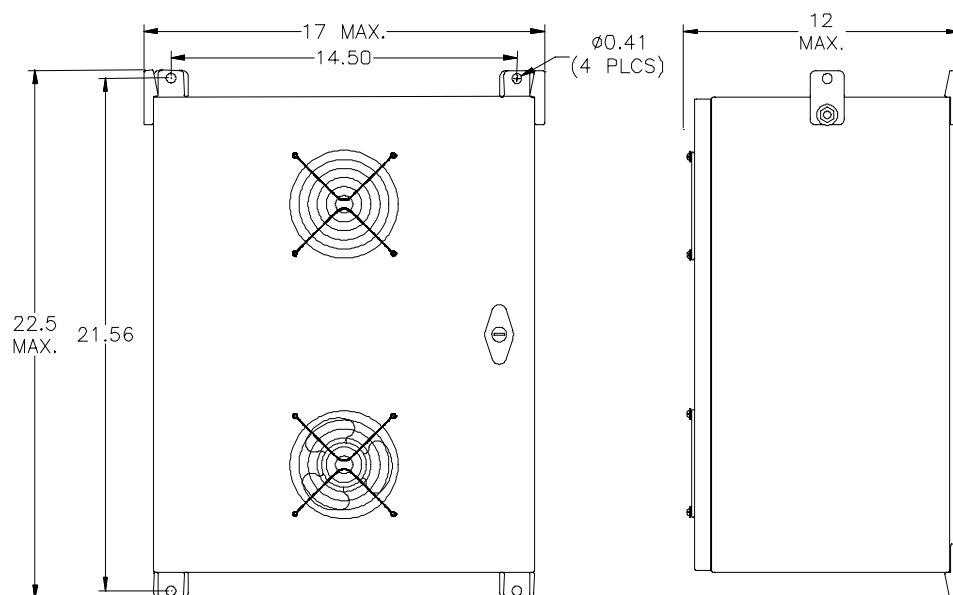


Figure 25

Cabinet-003

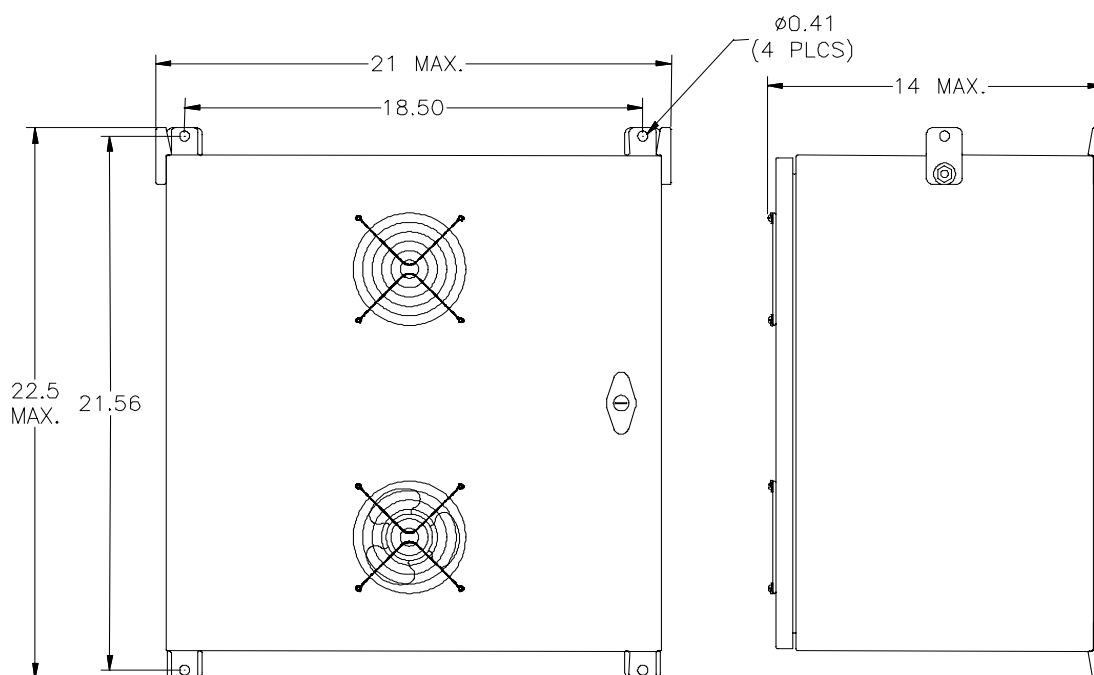


Figure 26
Cabinet-004

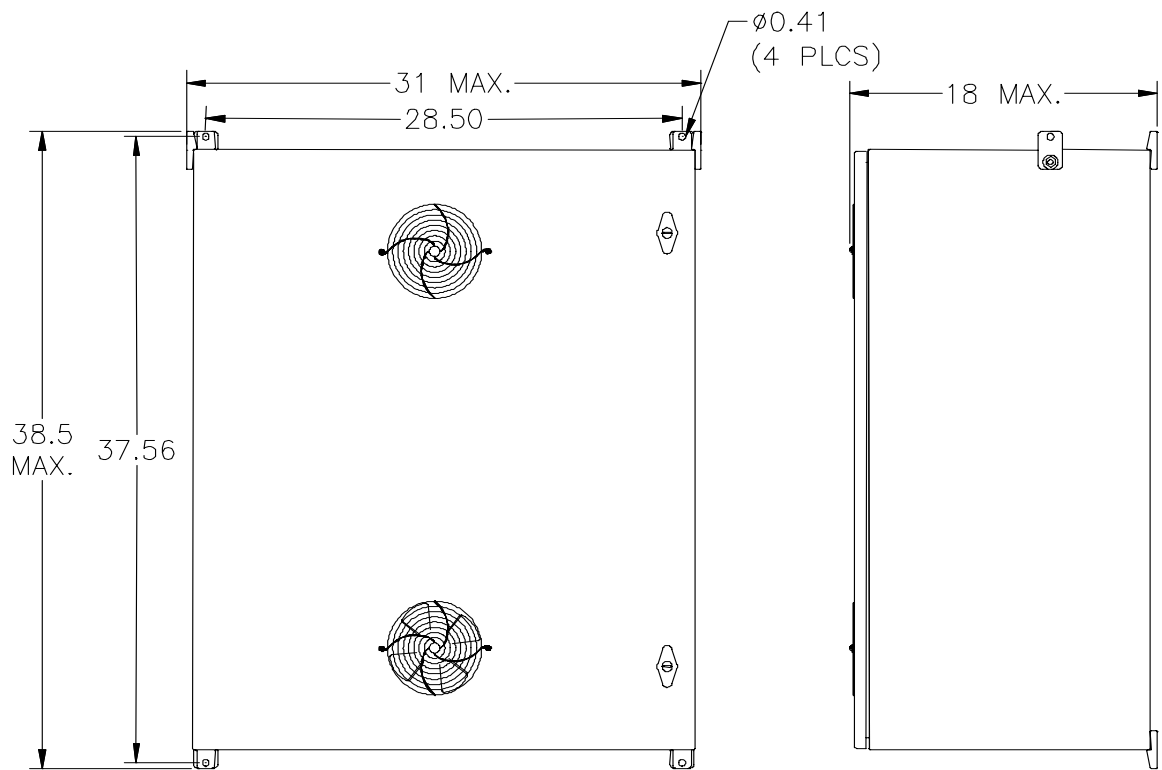
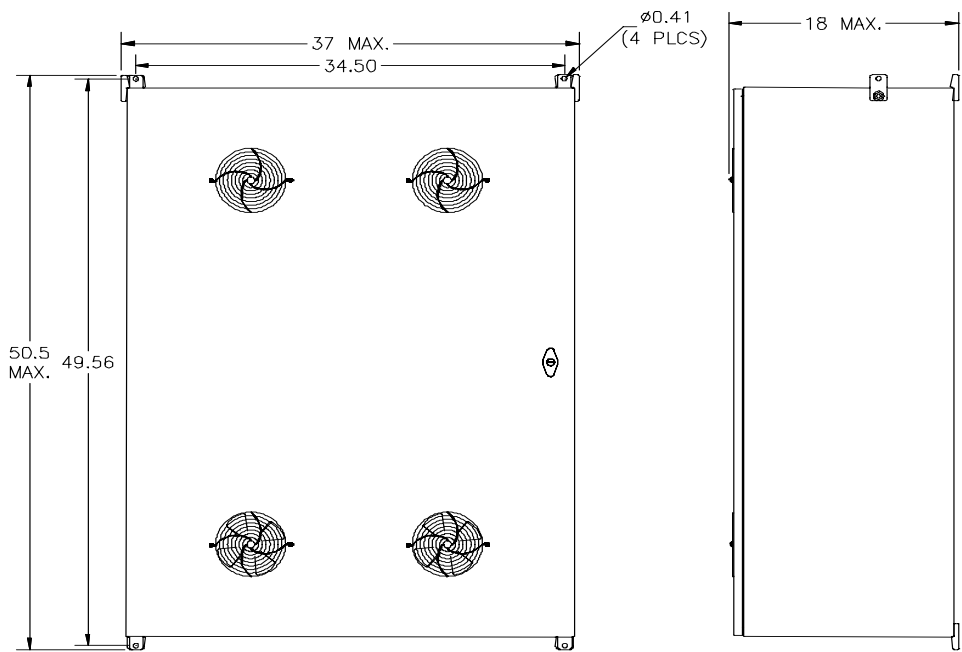
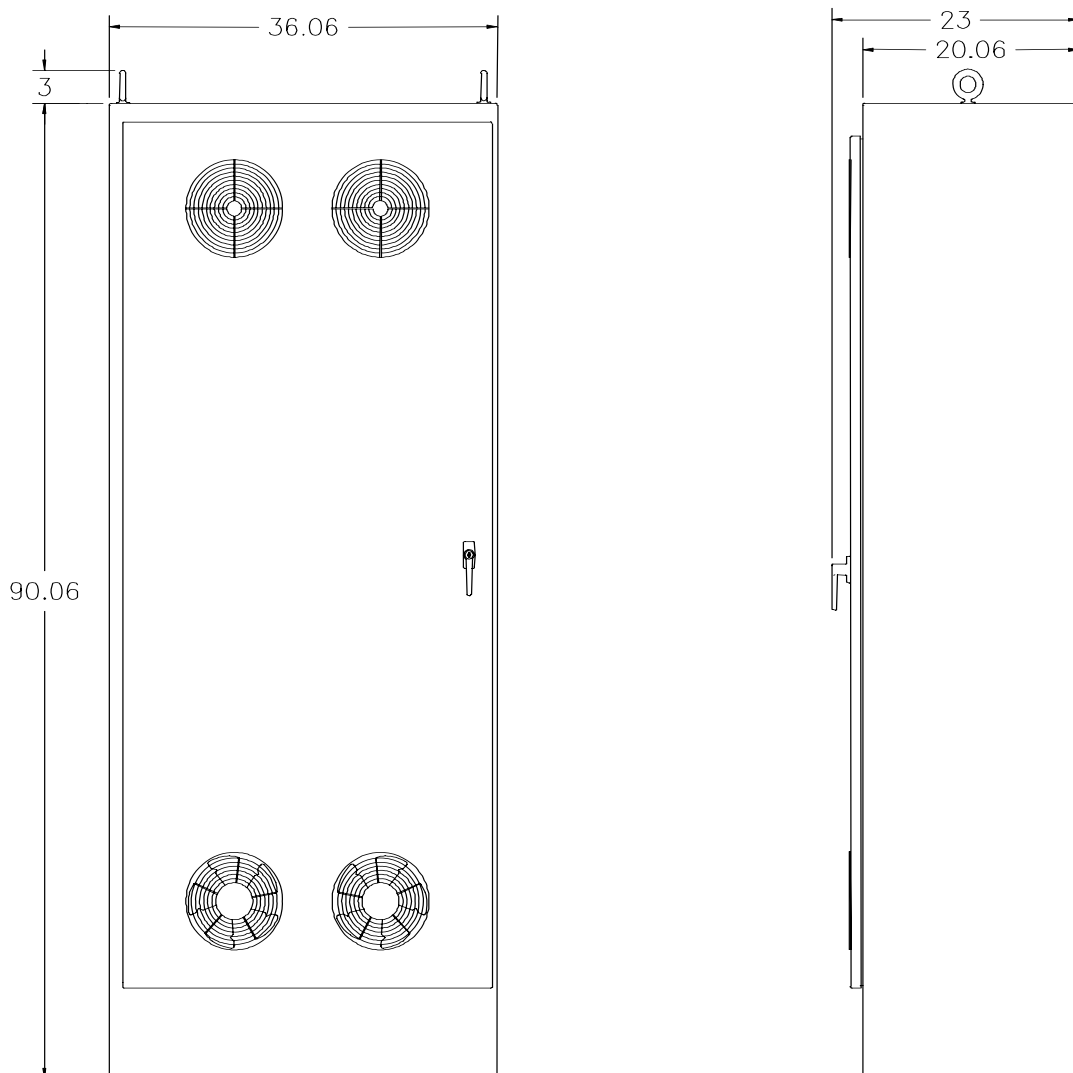


Figure 27
Cabinet-005



INSTALLATION INSTRUCTIONS - continued

Figure 28
Cabinet-006



Note: For 5% filters rated 320 Amps to 482 Amps a separately mounted input reactor is required. Refer to Figure 18 for mounting dimensions.

INSTALLATION INSTRUCTIONS - continued

Power Wiring Connection

WARNING

Input and output power wiring to the filter should be performed by authorized personnel in accordance with the NEC and all local electrical codes and regulations.

Verify that the power source to which the filter is to be connected is in agreement with the nameplate data on the filter. A fused disconnect switch or circuit breaker should be installed between the filter and its source of power in accordance with the requirements of the NEC and all local electrical codes and regulations. Refer to the drive user manual for selection of the correct fuse rating and class.

The filter is suitable for use on a circuit capable of delivering not more than 100,000 rms symmetrical amperes at 600 volts when protected by J, T or RK1 class fuses. or a circuit breaker.

For panel mounted filter applications rated 44 amperes and below, interconnection between the filter, its power source, and the drive is shown in Figure 29. Refer to the drive user manual for instructions on interconnecting the drive and motor and the correct start-up procedures for the drive.

The filter is designed for use with copper conductors with a minimum temperature rating of 75 degrees C. Table 8 lists the wire range and terminal torque requirements for the power input and output connections by horsepower rating.

For panel mounted filters rated 52 amperes or more, the filter reactors are supplied on a sub-panel and the filter capacitors are supplied on one or more assemblies. Refer to Figure 30 for the interconnection diagram. The capacitor assembly should be located in the lowest temperature regions of the

enclosure – generally toward the bottom – and the reactor assembly may be located in any region where the ambient temperature does not exceed 50 degrees C. Size the conductors interconnecting the reactor and capacitor assemblies to carry the current shown in Table 3. For terminal specifications on the capacitor assembly, refer to Table 9.

For filters supplied in general purpose NEMA 1, 2 & 3R cabinets, interconnection between the filter, its power source, and the drive is shown in Figure 31. Refer to Figures 33 to 36 for the location of input, output, ground and over temperature switch terminals. Refer to the drive user manual for instructions on interconnecting the drive and motor and the correct start-up procedures for the drive.

For filters supplied in industrial style NEMA 1 cabinets, interconnection between the filter, its power source and the drive is shown in Figure 32. Refer to Figures 37 to 41 for the location of input, output, ground and over temperature switch terminals. Refer to the drive user manual for instructions on interconnecting the drive and motor and the correct start-up procedures for the drive.

Grounding and Ground Fault Protection

The filter must always be grounded with a grounding conductor connected to all ground terminals.

Due to high leakage currents associated with variable frequency drives, ground fault protective devices do not necessarily operate correctly when placed ahead of a matrix filter feeding a drive. When using this type of device, its function should be tested in the actual installation.

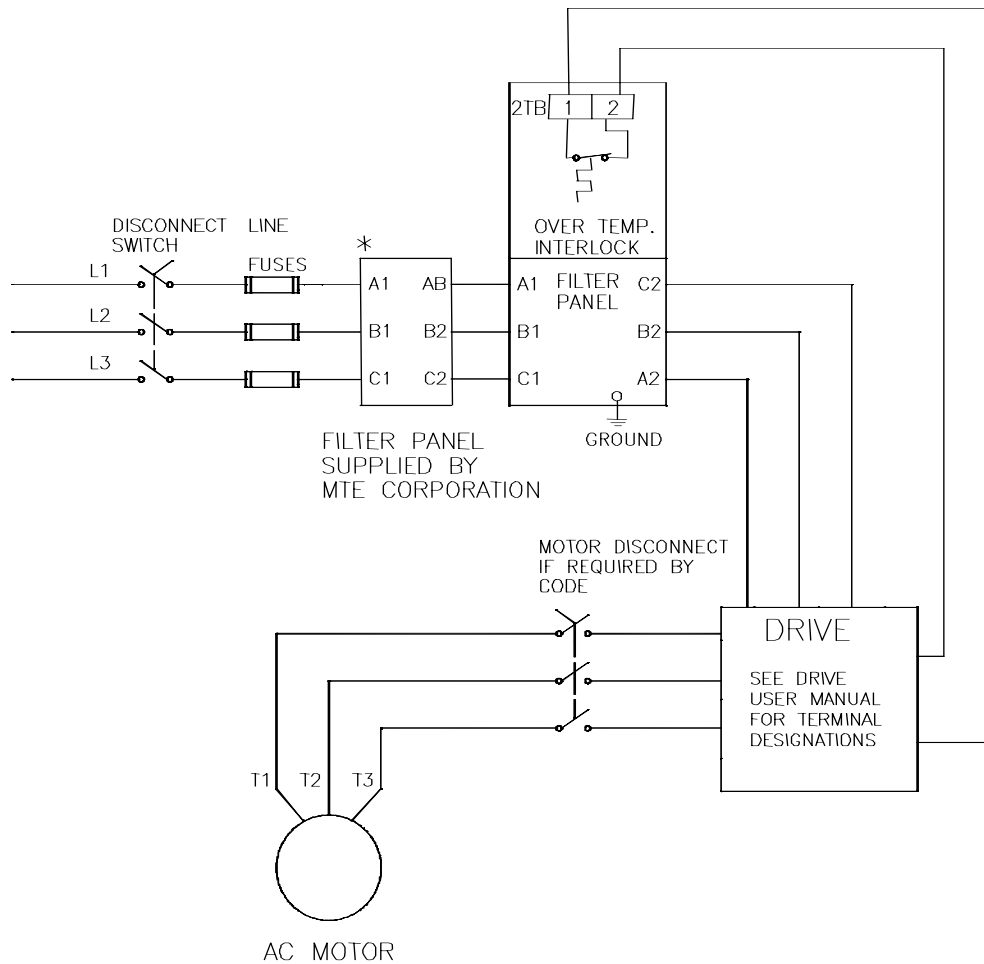
INSTALLATION INSTRUCTIONS - continued

Table 8
Input and Output Terminal Specifications

Filter Rating(Amps)	Input Terminals		Output Terminals	
	Wire Range (AWG)	Terminal Torque (in-lbs)	Wire Range (AWG)	Terminal Torque (in-lbs)
6	22 -14	4.5	22 – 14	4.5
8				
11	22 - 14	4.5	22 – 14	4.5
14	22 - 14	4.5	22 – 5	16
21	22 - 5	16	22 – 5	16
27	22 - 5	16	22 – 5	16
34	22 - 5	16	18 – 4	20
44	22 - 5	16	18 – 4	20
52	18 – 4	20	18 – 4	20
66	18 – 4	20	6-4 2-0	45 50
83	6-4 2-0	45 50	6-4 2-0	45 50
103	6-4 2-0	45 50	6-4 2-0	45 50
128	6-4 2-0	45 50	6-4 2-0	45 50
165	6-4 2-0	45 50	2-0000	150
208	2 – 0000	150	2 – 0000	150
240	2 – 0000	150	2 – 0000	150
320	2-0000	150	00 000-0000 250-350 MCM 500 MCM	180 250 325 375
403	00 000-0000 250-350 MCM 500 MCM	180 250 325 375	00 000-0000 250-350 MCM 500 MCM	180 250 325 375
482	00 000-0000 250-350 MCM 500 MCM	180 250 325 375	00 000-0000 250-350 MCM 500 MCM	180 250 325 375
636	NA	NA	NA	NA
786	NA	NA	NA	NA

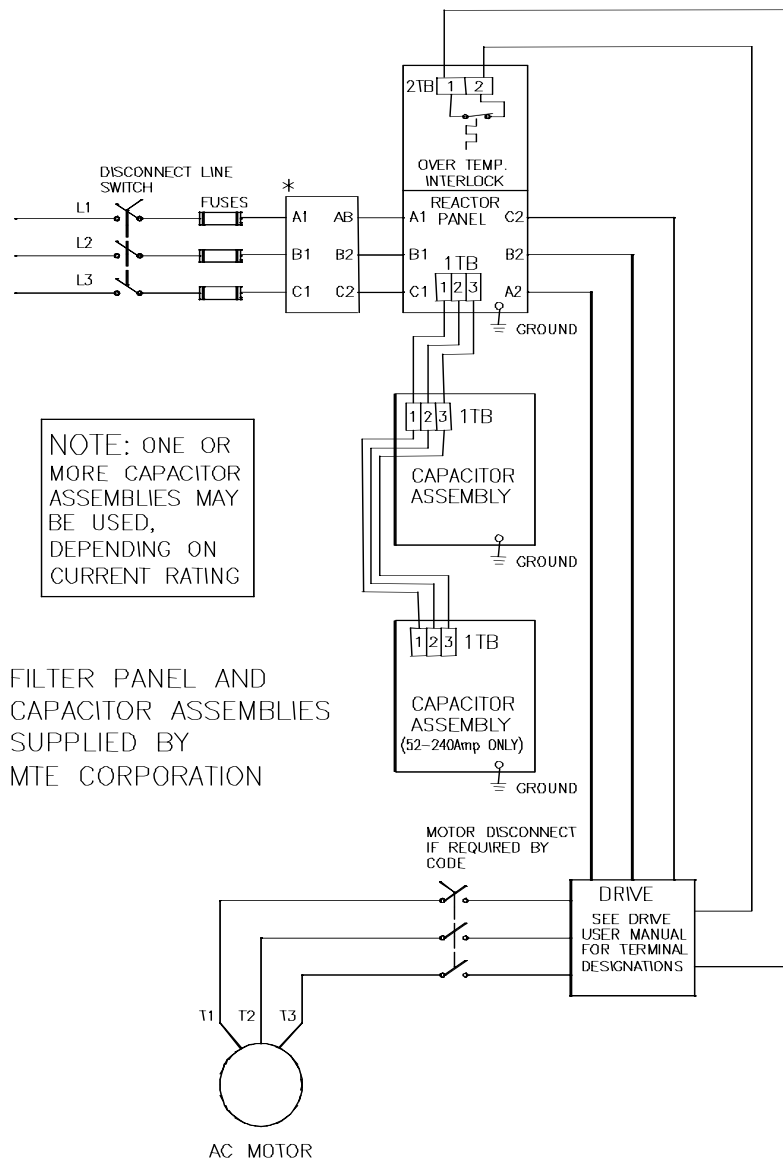
Figure 29

**Panel Mounted Filters 6 – 44 Amps, 600 VAC 60Hz
Interconnection Diagram**



* INPUT REACTOR REQUIRED FOR 5% FILTERS

Figure 30
Panel Mounted Filters 52 –786 Amps 600 VAC 60Hz
Interconnection Diagram



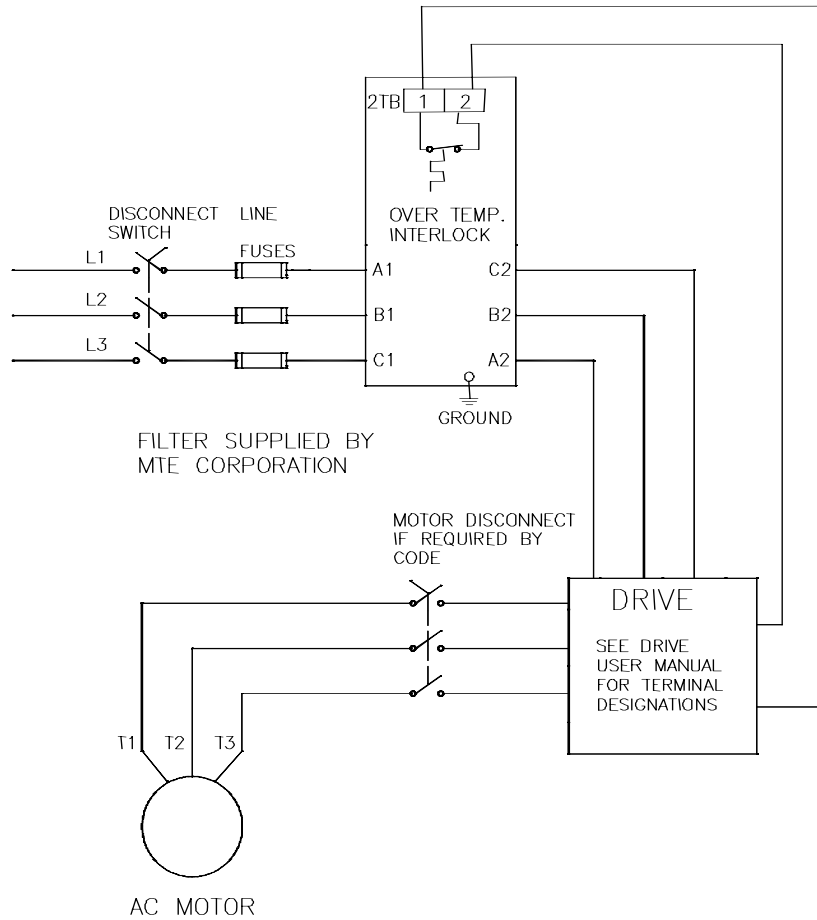
INSTALLATION INSTRUCTIONS - continued

Table 9
Capacitor Assembly Terminal Specifications

Filter Rating (Amps)	Capacitor Terminals <i>NOTE: Two terminals per phase</i>	
	Wire Range (AWG)	Terminal Torque (in lbs)
52 – 240	14 – 10	35
	8	40
	4 – 6	45
	1/0 – 3	50
320 - 482	6-00	120

Figure 31

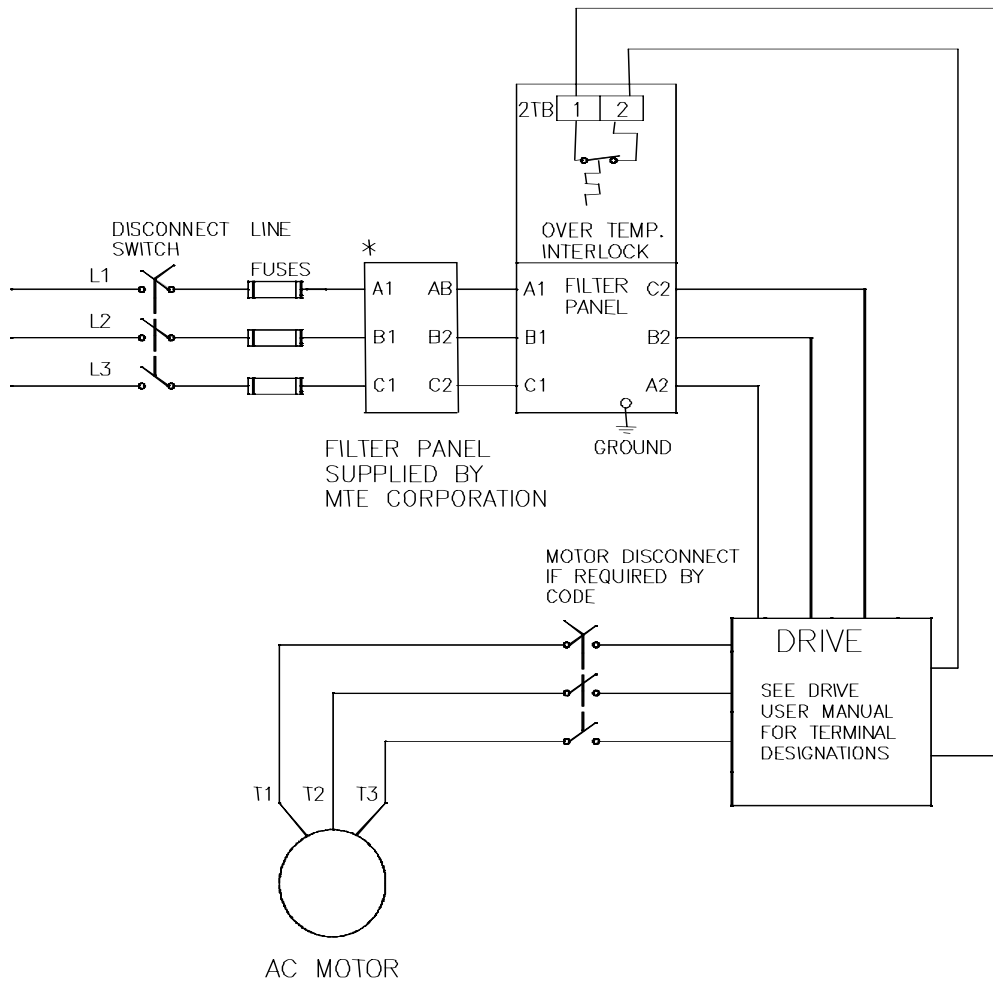
**Filters Mounted in General Purpose NEMA 1, 2 & 3R Cabinets
6 – 786 Amps, 600 VAC 60Hz Interconnection Diagram**



INSTALLATION INSTRUCTIONS - continued

Figure 32

**Filters Mounted in Industrial Style Cabinets
6 – 482 Amps, 600 VAC 60Hz
Interconnection Diagram**

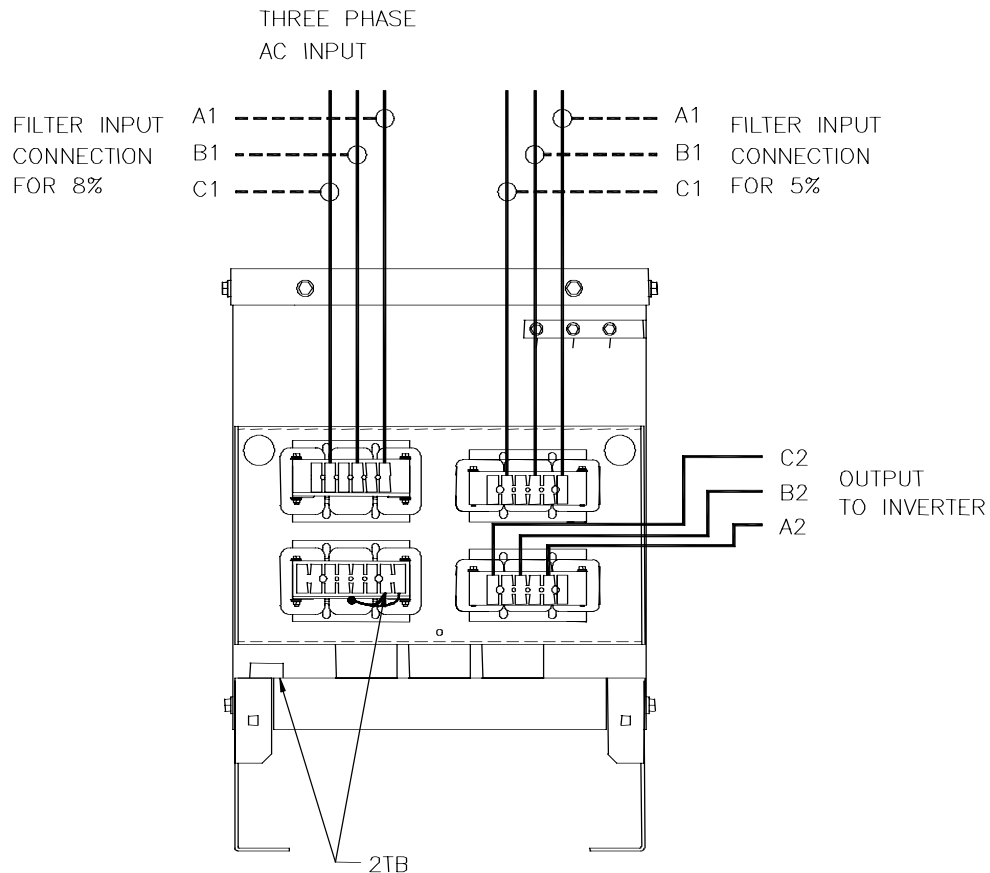


* INPUT REACTOR REQUIRED FOR 5% FILTERS
RATED 320 TO 482 AMPS

INSTALLATION INSTRUCTIONS - continued

Figure 33

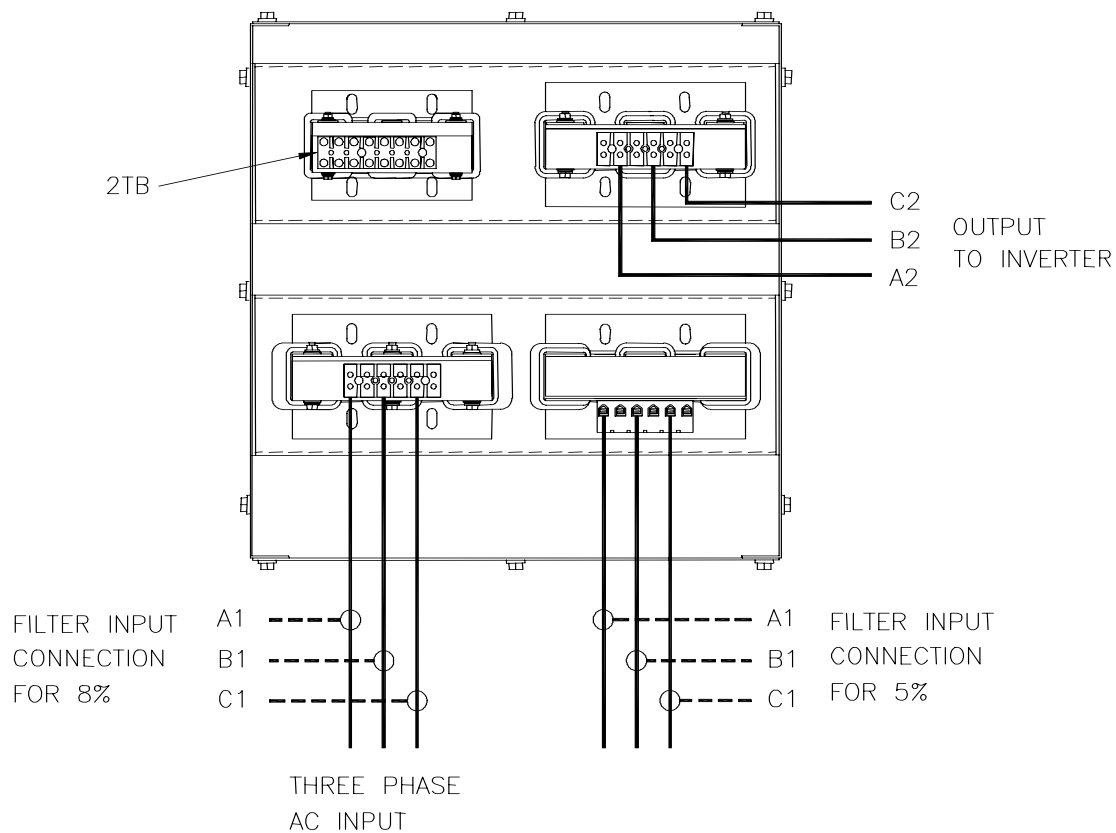
**6 – 14 Amps, 600 VAC 60Hz General Purpose Cabinet
Terminal Locations**



FRONT VIEW

See Figure 31 for Interconnection Diagram

Figure 34
21 – 44 Amps, 600 VAC 60Hz General Purpose Cabinet
Terminal Locations

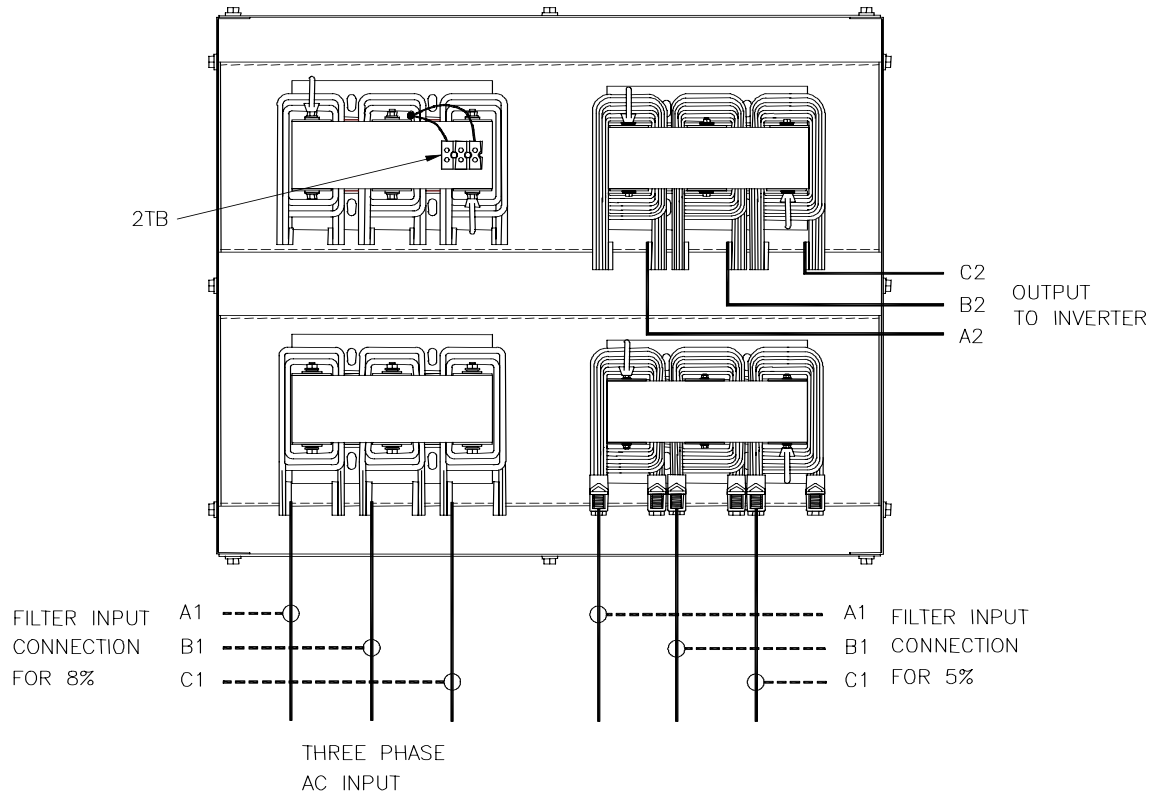


TOP VIEW

See Figure 31 for Interconnection Diagram

INSTALLATION INSTRUCTIONS - continued

Figure 35
52 – 240 Amps, 600 VAC 60Hz General Purpose Cabinet
Terminal Locations

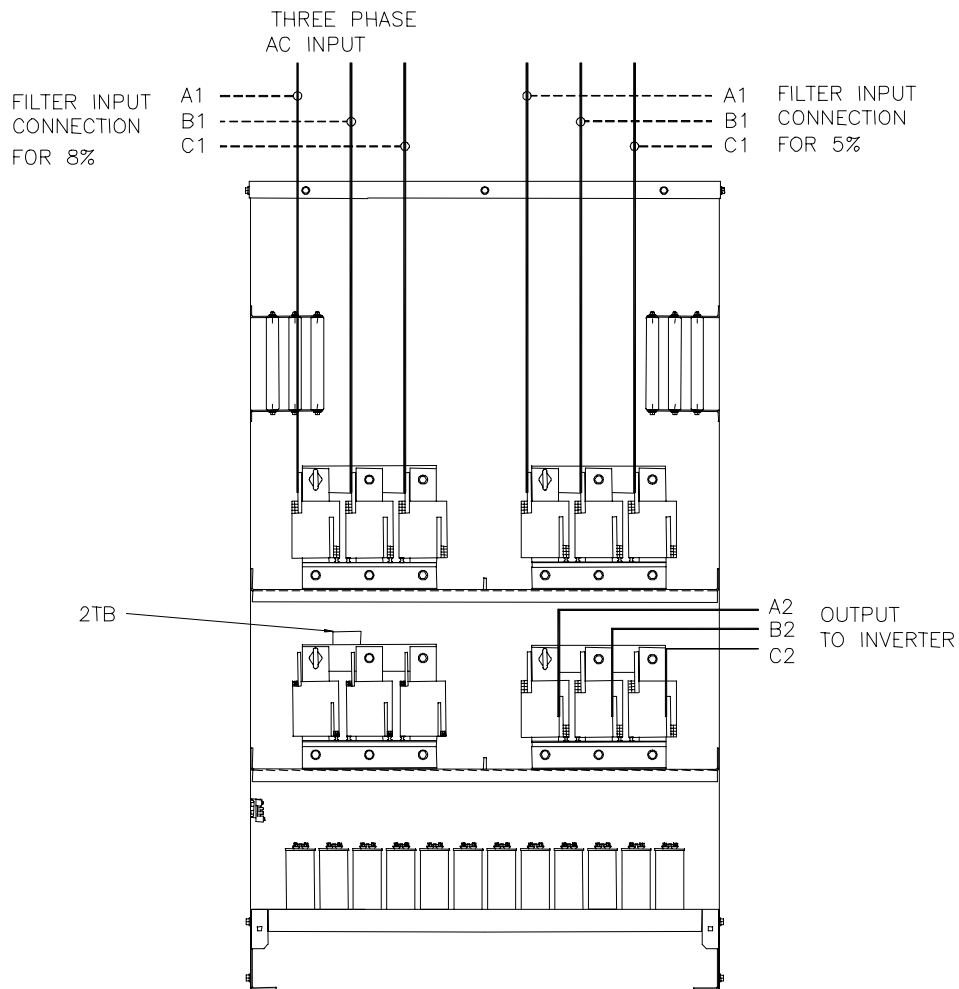


TOP VIEW

See Figure 31 for Interconnection Diagram

INSTALLATION INSTRUCTIONS - continued

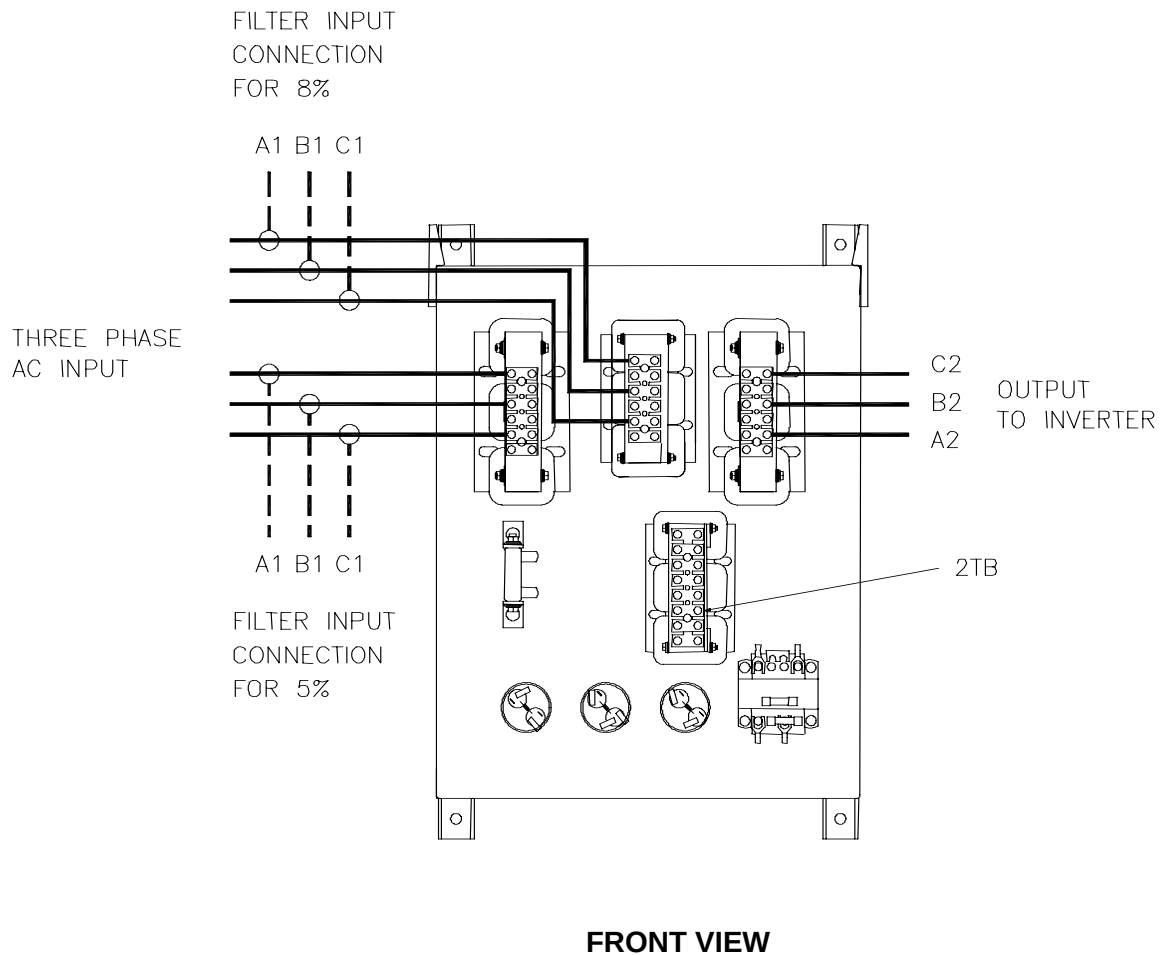
Figure 36
320 – 786 Amps, 600 VAC 60Hz General Purpose Cabinet
Terminal Locations



FRONT VIEW

See Figure 31 for Interconnection Diagram

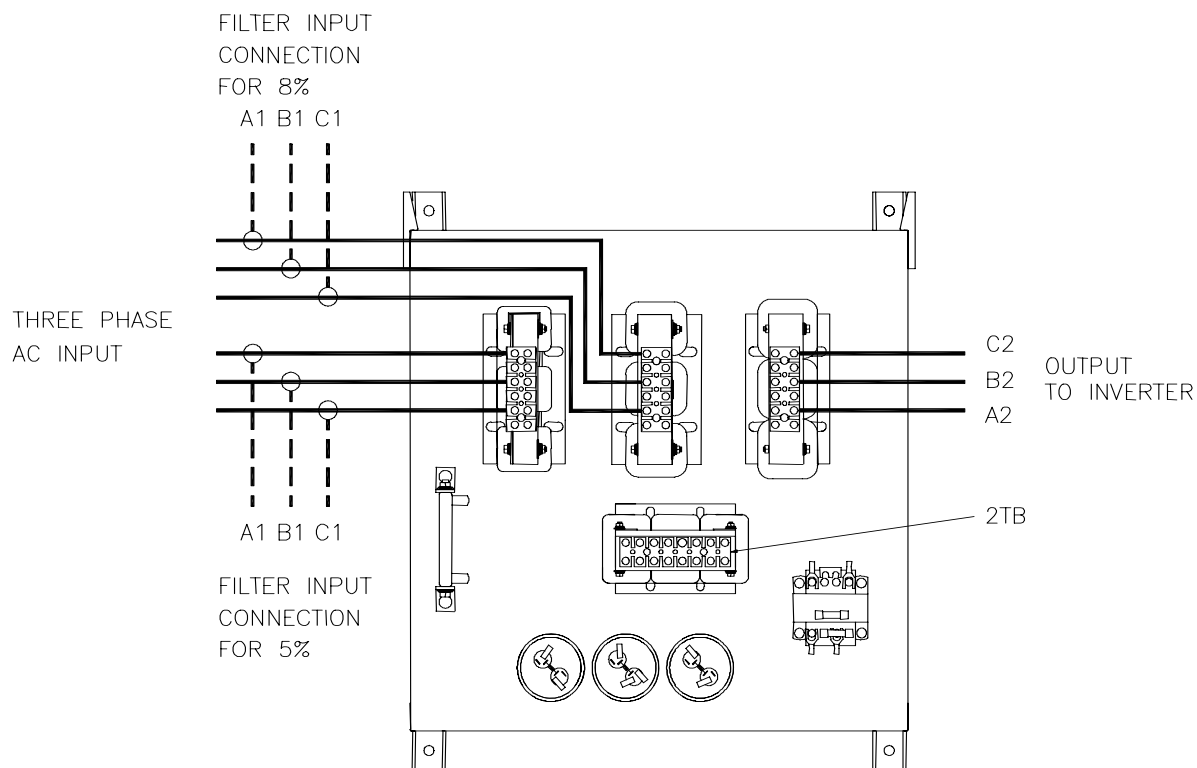
Figure 37
6 – 21 Amps, 600 VAC 60Hz Industrial Enclosures
Terminal Locations



See Figure 32 for Interconnection Diagram

Figure 38

**27 – 44 Amps, 600 VAC 60Hz Industrial Enclosures
Terminal Locations**



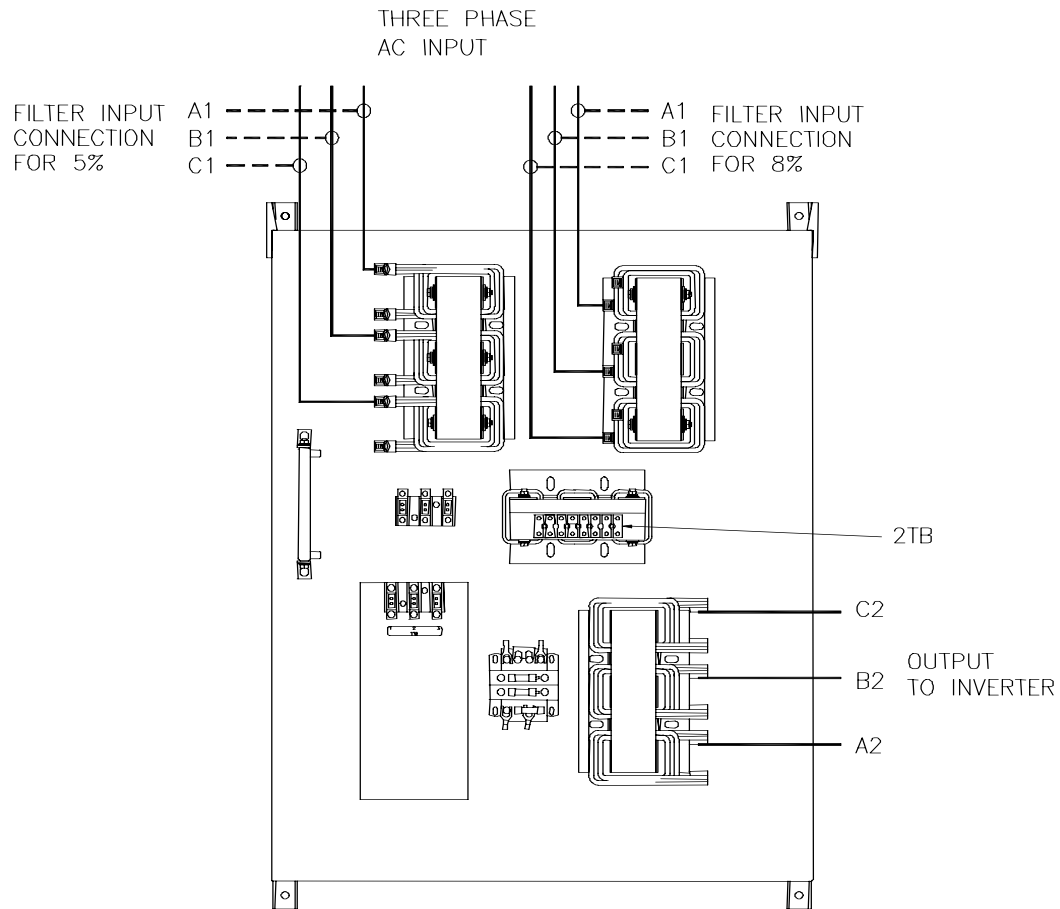
FRONT VIEW

See Figure 32 for Interconnection Diagram

INSTALLATION INSTRUCTIONS - continued

Figure 39

**52 – 128 Amps, 600 VAC 60Hz Industrial Enclosures
Terminal Locations**

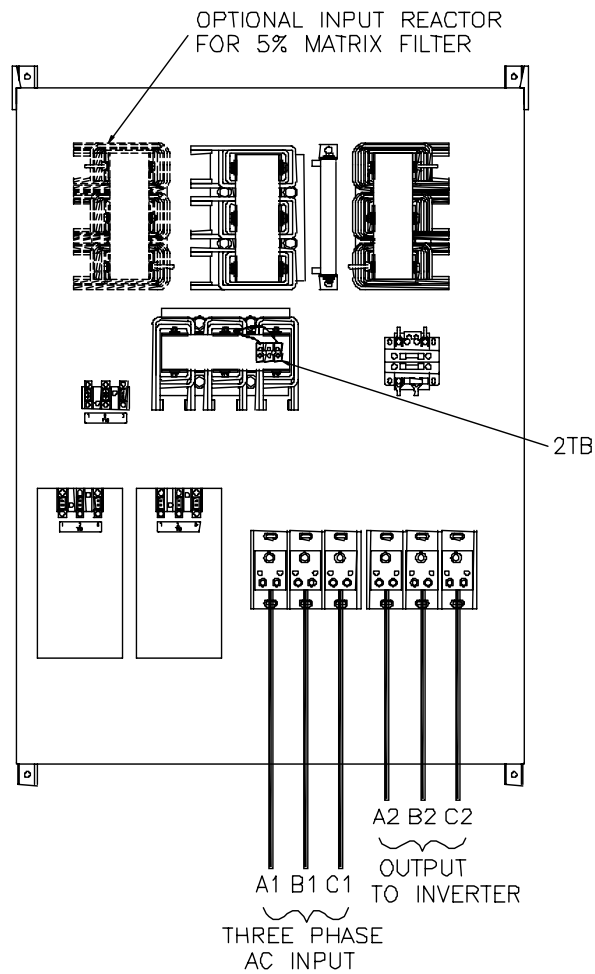


FRONT VIEW

See Figure 32 for Interconnection Diagram

INSTALLATION INSTRUCTIONS - continued

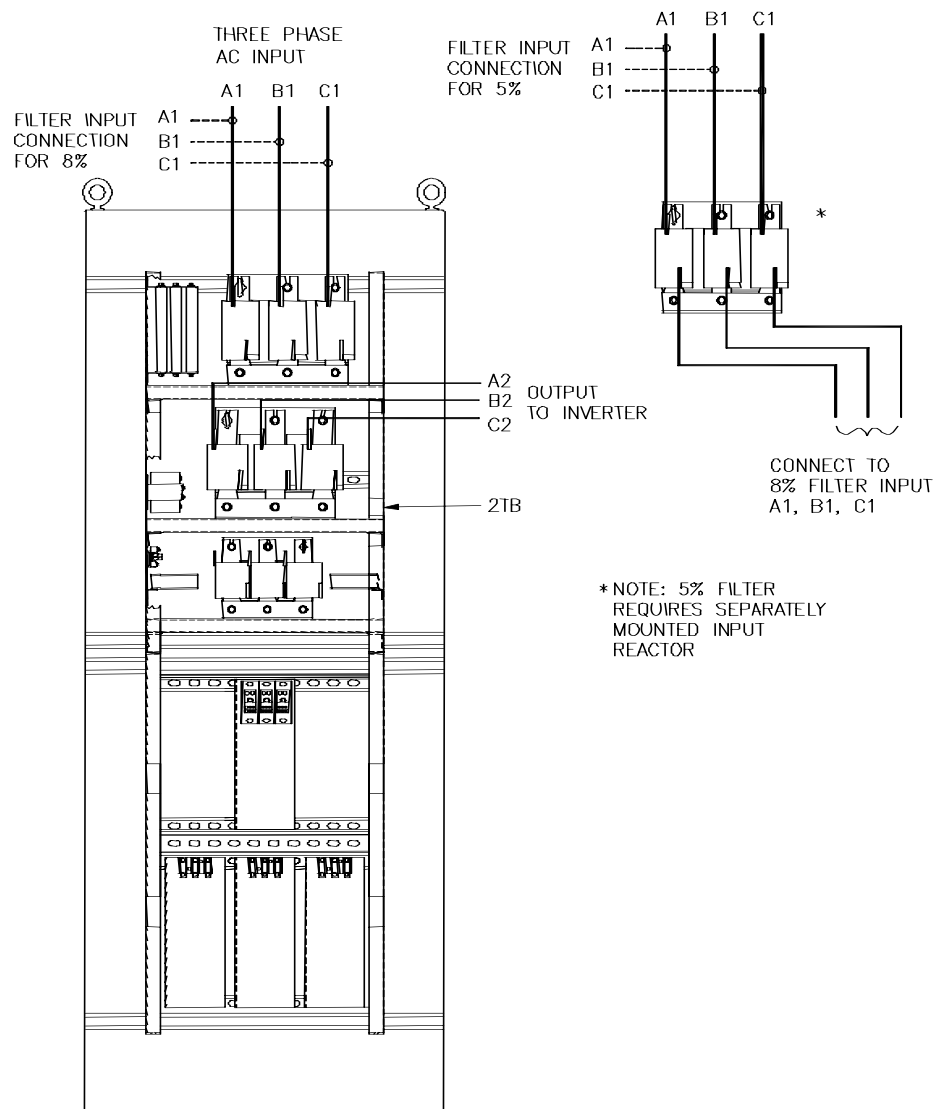
Figure 40
165 – 240 Amps, 600 VAC 60Hz Industrial Enclosures
Terminal Locations



FRONT VIEW

See Figure 32 for Interconnection Diagram

Figure 41
320 – 482 Amps, 600 VAC 60Hz Industrial Enclosures
Terminal Locations



FRONT VIEW

See Figure 32 for Interconnection Diagram

INSTALLATION INSTRUCTIONS - continued

Over Temperature Switch

Table 9

TYPE	BI – METAL THERMAL SWITCH
CONTACT	(NC) NORMALLY CLOSED Slow break / slow make
RATINGS	6A 120 VAC RESISTIVE 3A 240 VAC RESISTIVE 8A 12 VDC RESISTIVE 4A 24 VDC RESISTIVE 5A 120 VAC INDUCTIVE 2.5A 240 VAC INDUCTIVE
TEMPERATURE CONTACTS	Open at 180°C +/- 5

6. FILTER DESCRIPTION

The MTE Matrix Filter is a low pass filter containing proprietary technology, which makes it particularly useful for harmonic mitigation of adjustable speed drives. Figure 42 shows a block diagram of the filter. Three phase AC power is connected to the input section which contains a three phase AC reactor and circuitry which inhibits oscillation of the filter with the AC power system. The center leg consists of a series reactor and capacitor bank. Because of the capacitor bank the filter operates with leading power factor at all loads, but unlike trap filters the MTE Matrix Filter does not produce significant voltage rise at the point of common coupling with the power system. The standard 8% filter output section consists of an AC output reactor.

The 5% filter is comprised of a standard 8% filter plus an additional input reactor.

Matrix filters are suitable for use with AC and DC drives and they can be used in both regenerative and non-regenerative applications when properly selected.

Filters for variable torque AC drives rated 7.5 Hp and above should be selected for a filter output current rating greater than or equal to the motor current rating. If the motor current rating is not available, use the NEC motor current rating.

Filters for variable torque AC drives rated 2 – 5 Hp should be selected for a filter output

current rating greater than or equal to 105% of the motor current rating. If the motor current rating is not available, select on the basis of 105% of the NEC motor current rating.

Filters for variable torque AC drives rated less than 1.5 Hp should be selected for an output current rating greater than or equal to 110% of the motor current rating or 110% OF the NEC motor current rating.

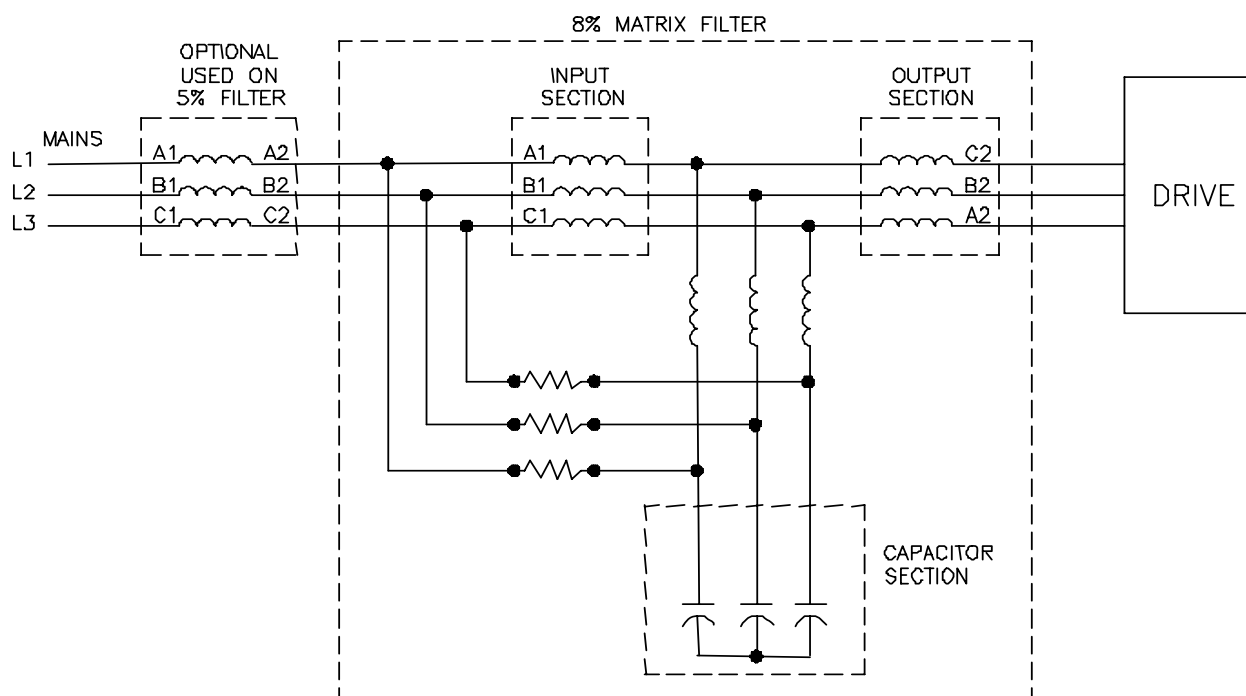
For constant torque, AC and DC drive applications operating from six pulse rectifier front ends selected a filter current rating according to application engineering note "Matrix Filter Operation in Constant Torque Applications with Six Pulse Rectifiers" or consult MTE engineering. For phase controlled DC drive applications, select filter current rating per application note "Matrix Filter with Phase Controlled DC Drivers.

Where a single filter is used to feed multiple drives, the output current rating of the filter should be selected to equal the total current rating of the individual drives when calculated according to the instructions above.

Because the filter supplies harmonic currents required by the drive, linear loads (such as space heaters, incandescent lighting and AC motors operated across the line) should not be connected to the output of the filter.

Figure 42

600 VAC 60Hz Block Diagram



7. STARTUP

Safety Precautions

Before startup, observe the following warnings and instructions:

WARNING

Internal components of the filter are at line potential when the filter is connected to the utility. This voltage is extremely dangerous and may cause death or severe injury if you come in contact with it.

WARNING

After disconnecting the utility power, wait at least 5 minutes before doing any work on the filter connections. After removing power, allow at least five minutes to elapse and verify that the capacitors have discharged to a safe level before contacting internal components. Connect a DC voltmeter across the capacitor terminals or terminals 1, 2 and 3 on terminal block 1TB. Start with the meter on the highest scale and progressively switch to a lower scale as the indicated voltage falls below the maximum value of the scale used.

Sequence of Operation

1. Read and follow safety precautions.
2. After installation, ensure that:
 - All filter ground terminals are connected to ground.
 - Power wiring to the utility, drive and motor is in accordance with the installation and connection instructions in Chapter 5.

3. Check that moisture has not condensed on the filter components. If moisture is present, do not proceed with startup until the moisture has been removed.
4. Disconnect the filter output from the drive.
5. Connect the filter to the utility.

WARNING

Use extreme caution to avoid contact with line voltage when checking for power. INJURY OR DEATH MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED.

6. Confirm that line voltage is present at the input terminals (A1, B1, C1) of the filter.
7. Confirm that line voltage is present at the output terminals (A2, B2, C2) of the filter.
8. Disconnect the filter from the utility.
9. Connect the filter output to the drive.
10. Refer to the drive user manual for the drive startup procedure. Observe all safety instructions in the drive user manual.

WARNING

INJURY OR DEATH MAY RESULT IF THE DRIVE SAFETY PRECAUTIONS ARE NOT OBSERVED.

CAUTION

Damage to equipment may occur if the drive startup procedures are not observed.

8. TROUBLESHOOTING

WARNING

When properly installed, this equipment has been designed to provide maximum safety for operating personnel. However, hazardous voltages exist within the confines of the enclosure. Servicing should therefore be performed by qualified personnel only and in accordance with OSHA Regulations.

To aid in troubleshooting, a block diagram is shown in Figure 42, and a list of potential problems and solutions are listed below.

WARNING

High voltage is used in the operation of this filter. Use Extreme caution to avoid contact with high voltage when operating, installing or repairing this filter. INJURY OR DEATH MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED.

After removing power, allow at least five minutes to elapse and verify that the capacitors have discharged to a safe level before contacting internal components. Connect a DC voltmeter across the capacitor terminals or terminals 1, 2 and 3 on terminal block 1TB. Start with the meter on the highest scale and progressively switch to a lower scale as the indicated voltage falls below the maximum value of the scale used.

PROBLEM:	Line voltage is not present at the filter output terminals.
Possible cause:	Power to the filter is turned off.
Solution:	Turn power on.
Possible cause:	One or more external line fuses are blown.
Solution:	Verify the continuity of line fuses in all phases. Replace as necessary.

TROUBLESHOOTING - continued

PROBLEM:	Harmonic current distortion exceeds 8% on one or more phases at full load.
Possible cause:	On filters rated 52 amps and above, the capacitor assembly has not been connected.
Solution:	Check interconnection of capacitor assembly with reactor panel (Figure 30).
Possible cause:	A capacitor has failed.
Solution:	Inspect the tops of all capacitors for bowing. Replace failed capacitors.
Possible cause:	Source impedance is less than 1.5%.
Solution	Add a minimum 1.5% impedance line reactor to the filter input
Possible cause:	Input source voltage harmonic distortion.
Solution	Identify equipment causing harmonic voltage distortion and add filters as required or accept elevated THVD
Possible cause:	Line voltage unbalance exceeds 1%.
Solution:	Balance input line voltage to 1% or less.

PROBLEM:	Harmonic current distortion exceeds 5% on one or more phases at full load.
Possible cause:	The input reactor required for a 5% filter was not installed. (See Figure 42.)
Solution:	Install the required input reactor
Possible cause:	On filters rated 52 amps and above, the capacitor assembly has not been connected.
Solution:	Check interconnection of capacitor assembly with reactor panel (Figure 30).
Possible cause:	A capacitor has failed.
Solution:	Inspect the tops of all capacitors for bowing. Replace failed capacitors.

TROUBLESHOOTING - continued

PROBLEM:	Harmonic current distortion exceeds 5% on one or more phases at full load.
Possible cause:	Source impedance is less than 1.5%.
Solution	Add a minimum 1.5% impedance line reactor to the filter input
Possible cause:	Input source voltage harmonic distortion.
Solution	Identify equipment causing harmonic voltage distortion and add filters as required or accept elevated THVD
Possible cause:	Line voltage unbalance exceeds 1%.
Solution:	Balance input line voltage to 1% or less.

PROBLEM:	Filter output voltage is not within specification
Possible cause:	Filter input voltage is not within specification.
Solution:	Check the AC input line voltage and verify that it is within tolerance. Refer to the filter service conditions and performance specifications in Chapter 3 for tolerances.
Possible cause:	Source impedance is out of tolerance.
Solution:	Verify that the source impedance is within tolerance. Refer to the filter service conditions and performance specifications in Chapter 4 for tolerances.